

Health in Rural Missouri

**Biennial Report
2012 - 2013**



Missouri Department of Health and Senior Services
Office of Primary Care and Rural Health

Health in Rural Missouri

2012-2013



Health in Rural Missouri is produced by the Office of Primary Care and Rural Health, Department of Health and Senior Services.

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EXECUTIVE SUMMARY

The Missouri Office of Rural Health (Office) was established by the 1990 General Assembly (192.604 RSMo) to “assume a leadership role in working or contracting with state and federal agencies, universities, private interest groups, communities, foundations and local health centers to develop rural health initiatives and maximize the use of existing resources...” Located within the Missouri Department of Health and Senior Services’ Office of Primary Care and Rural Health, the Office reports on current activities and makes recommendations to the Missouri Governor and General Assembly every two years. This report also provides an analysis of the current health of rural Missourians to support those activities and recommendations.

Of the over 6,000,000 residents of Missouri, 2.23 million, or 37 percent, are considered rural.¹ Since 2002, rural areas overall have experienced a 6.2 percent increase in residents; however, this increase is very uneven. Over this time period, 10 rural counties in Northern Missouri had population losses of greater than 5 percent, while 4 rural counties adjacent to urban counties experienced population increases of 20 percent.^{2,3}

In terms of socioeconomics, rural Missourians are at a significant disadvantage compared to their urban counterparts when considering income and education. Missouri’s rural poverty rate (18.0 percent) is 24.1 percent higher than its urban poverty rate (14.5 percent). Poverty rates for youth in rural Missouri are 26.3 percent, while for urban youth the rate is 19.9 percent. Staggeringly, 8 counties, all rural, have youth poverty rates above 40 percent.⁴ U.S. Census Bureau data indicate that rural Missourians are also approximately half as likely to hold a college degree as urban Missourians (15.8 percent for rural versus 31.2 percent for urban).

When analyzing standard markers of health status, rural Missourians are overall less healthy than their urban counterparts and more likely to die at an earlier age. The 2006-2010 average life expectancy for rural areas was 76.5 years compared to 77.5 years for urban areas.⁵ The rural death rate for all causes during 2011 was 853.4 deaths per 100,000 residents, while in urban areas this rate was nearly 10 percent less, at 778.9 deaths per 100,000.⁶ Additionally, for all of the 10 leading causes of death, rural rates are higher than urban rates. Somewhat paradoxically, urban residents are hospitalized at a significantly greater rate than rural residents (1,191.9 per 10,000 residents for urban versus 1,140.3 for rural). Thus, a higher rate of urban residents receive hospital treatment for diseases, such as cancer, while a higher rate of rural residents die from those diseases.

Rural Missourians continue to demonstrate increased levels of health risk factors which affect many of the health conditions discussed in this report. Compared to urban residents, rural residents report significantly higher rates of smoking (24.6 percent versus 21.6 percent), lower levels of physical activity (26.4 percent report no leisure-time physical activity versus 22.0 percent), increased rates of obesity (32.3 percent versus 28.9 percent), higher rates of diagnosed high blood pressure and high cholesterol (37.4 percent versus 32.6 percent and 46.9 percent versus 43.5 percent), and lower rates of preventative screenings such as mammograms and colonoscopies.

¹U.S. Census Bureau, State & County QuickFacts

²This report uses the regional classifications developed by the Behavioral Risk Factor Surveillance System (BRFSS)

³U.S. Census Bureau, 2002 Census and 2012 Census estimates

⁴U.S. Census Bureau. *Small area income and poverty estimates*. Accessed 2013, September 16, from <http://www.census.gov/did/www/saipe/data/interactive/#>.

⁵Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination

⁶Missouri Department of Health and Senior Services, MICA (Missouri Information for Community Assessment), Death MICA



Health care resources in rural Missouri are limited, even for those who have health insurance, have no financial difficulty, and have access to transportation. Of the 166 licensed hospitals in Missouri, 76 (41 percent) are located in rural areas. Of those 76 hospitals, nearly half (35), are Critical Access Hospitals which have 25 beds or less and provide a limited scope of service. As regards access to primary health care services, the vast majority of rural counties are designated as Health Professional Shortage Areas (HPSAs). Of the 101 rural counties, 98 are Primary Medical HPSAs, 98 are Primary Care Mental HPSAs, and 92 are Dental HPSAs.

Overall, this report highlights significant progress in the improvement of the health of rural Missourians over the past 10 years; however, it continues to highlight the significant inequality between rural and urban Missourians. Rural Missourians as a whole display a lower level of income, education, healthy behaviors, and access to health care services, which in turn leads to decreases in health status and life expectancy. The Office recommends a holistic approach to improving and equalizing health in Missouri which addresses socioeconomic factors, health behaviors, and access to health care services.

INTRODUCTION

The Missouri Office of Rural Health (hereinafter referred to as the “Office”) was established by the 1990 General Assembly (192.604 RSMo) to “assume a leadership role in working or contracting with state and federal agencies, universities, private interest groups, communities, foundations and local health centers to develop rural health initiatives and maximize the use of existing resources...” Located within the Department of Health and Senior Services, Office of Primary Care and Rural Health (OPCRH), the Office reports on current activities and make recommendations to the Missouri Governor and General Assembly every two years.

In order to contextualize the activities and recommendations of the Office, this report includes an analysis of the health of rural Missourians, as well as a Missouri definition of “rural”.

The report covers 4 specific areas:

- Demographic and Socioeconomic Indicators
- Health Status
- Health Behaviors/Risk Factors
- Health Care Resources

Throughout the report a dichotomy between urban and rural is utilized. This serves two purposes: First, it allows for a natural, readily understandable comparison to better highlight and understand health in rural Missouri. Second, it presents compelling evidence that your geographic location in Missouri has a significant bearing on your health.

It should be noted that both rural and urban Missourians, in general, have improved, and improving, health, when compared to any time point in the past. However, significant inequity in health between rural and urban Missourians persists with evidence of little change over time.



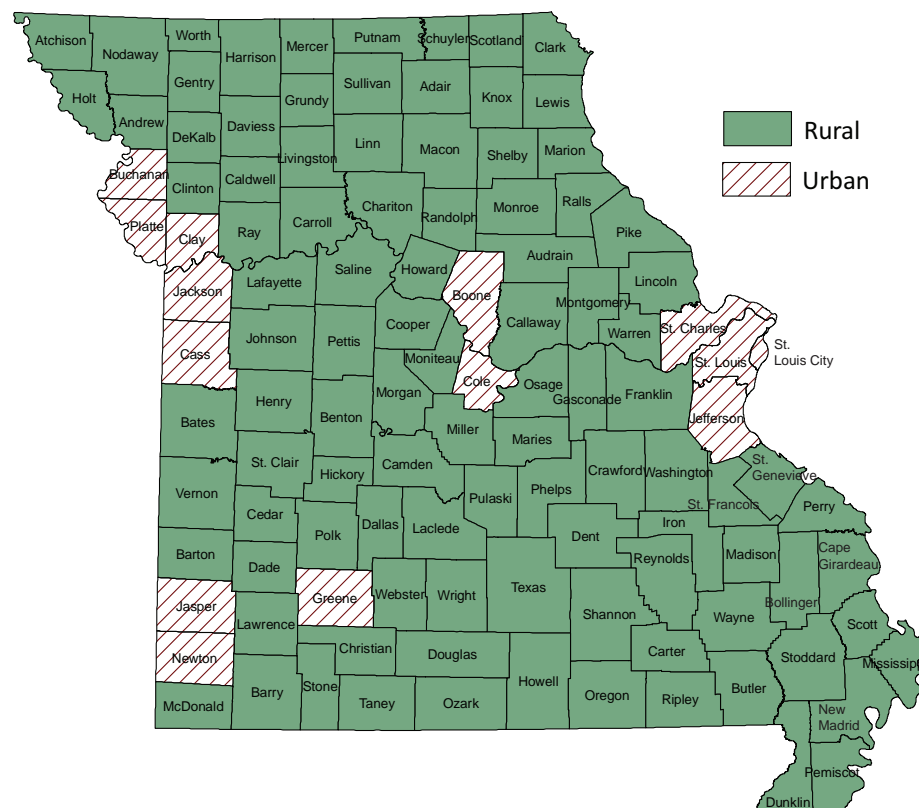
DEFINING RURAL MISSOURI

The United States Census Bureau and other federal agencies use varying definitions of rural. Each definition emphasizes different criteria, such as commuting patterns, population size and population density. As a result, different definitions generate different numbers of rural people.

This report defines urban counties as those with a population density over 150 people per square mile, plus any county that contains at least part of the central city of a census-defined Metropolitan Statistical Area (MSA). Using this definition, 14 Missouri counties are urban. The remaining 101 counties in Missouri are rural.



Rural/Urban County Classification



DEMOGRAPHIC AND SOCIOECONOMIC INDICATORS

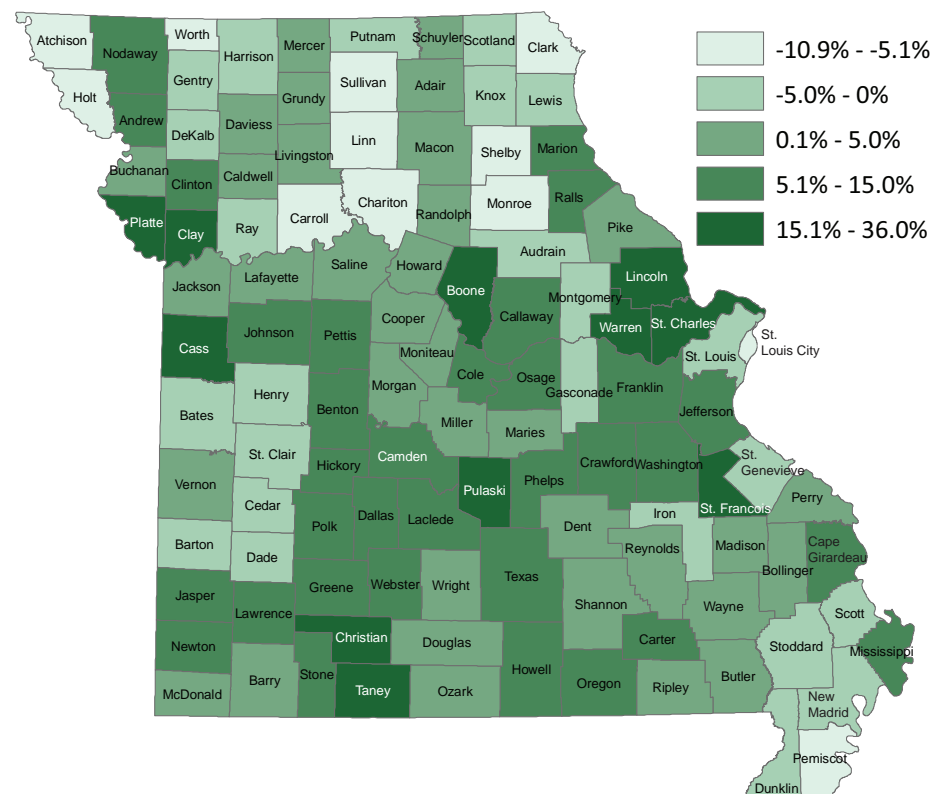
Population

The 2012 U.S. Census population estimate for Missouri is 6,021,988 residents. This represents a population increase of 6.1 percent from the 2002 estimate. While the amount of growth varies among individual counties, population increases are occurring in both rural and urban areas. Overall, rural areas increased by 6.2 percent, while urban areas increased by 6.1 percent during the past decade.

Population growth is not evenly distributed throughout rural Missouri. Thirty-three percent of Missouri's rural counties experienced population loss between 2002 and 2012. Three counties (Atchison, Worth, and Carroll) experienced at least a ten percent population decline. Ten of the 11 counties with a population loss of 5 percent or greater are located north of the Missouri River. In contrast, the greatest population increases occurred in counties adjacent to urban areas (Christian, Lincoln, Taney, and Warren). This is indicative of the growth of suburban communities.

Missouri's rural population is estimated at 2.23 million persons. Rural residents currently represent 37.0 percent of the state's population, a figure that has not changed since the 2010 Census.

**Population Change
Missouri, 2002-2012**



Source: U.S. Census Bureau

Natural Increase

Natural increase, which is defined as births minus deaths, plays a primary role in population change. The great majority (84.0 percent) of the statewide natural increase comes from urban counties.

In 2011, all 46 counties that had more deaths than births, or natural decreases, were rural. The largest natural decreases occurred in Stone (-91), Benton (-86), and Hickory (-82) Counties, which are all located in the Southwest BRFSS⁷ Region of the state. If this pattern continues, rural areas will need large positive migration totals in order to keep pace with urban growth.

Natural Increase, 2011

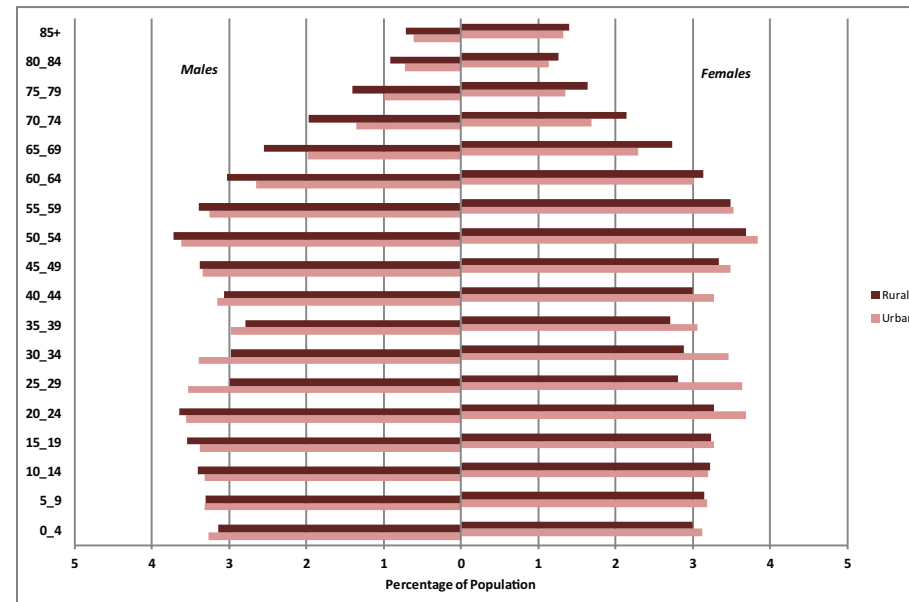
| | Births | Deaths | Natural Increase | Number of Births for Every 1 Death |
|-----------------------|--------|--------|------------------|------------------------------------|
| Missouri | 76,069 | 55,597 | 20,472 | 1.37 |
| Rural Missouri | 26,810 | 23,531 | 3,279 | 1.14 |
| Urban Missouri | 49,259 | 32,066 | 17,193 | 1.54 |

Source: Missouri Vital Statistics

Age

Population pyramids for rural and urban areas show the distribution of the Missouri population by gender and age group. In 2012, the overall Missouri population is almost evenly split between the two genders, at 49.0 percent male versus 51.0 percent female. In both rural and urban areas, males comprise a larger percentage of the population under age 20 while females comprise a larger percentage of the population over age 54. These gender differences by age group are especially noticeable in the 85+ age category, where the female-male ratio is greater than 2:1. Overall, rural Missourians are older than urban Missourians.

Age and Gender Distribution of Rural and Urban Populations Missouri, 2012



⁷See the Glossary for a description of the Behavioral Risk Factor Surveillance System (BRFSS)

Racial/Ethnic Diversity

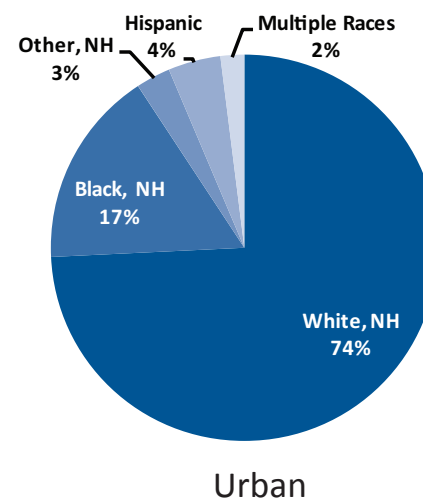
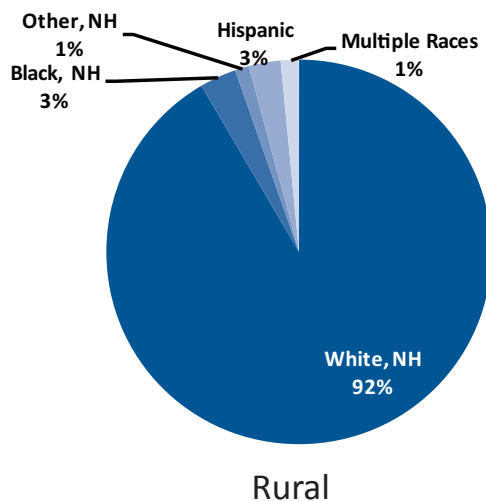
Missouri's rural population is less racially diverse than its urban population. Approximately 92 percent of rural residents identify themselves as white, non-Hispanic, which contrasts with only 74 percent of urban residents. The African American rural population is much smaller (3 percent of all residents) than the African American urban population (17 percent all of residents). Other non-Hispanic minority groups, such as American Indians, Asians, and Hawaiian/Pacific Islanders, are nearly three times more likely to live in urban counties.

In contrast, the Hispanic population is distributed much more evenly throughout both urban and rural areas. Only 7 of the 101 rural counties in Missouri have fewer than 50 Hispanic residents (based on 2012 estimates), while 28 rural counties have fewer than 50 African American residents.

Hispanics comprise four percent of the urban population and three percent of the rural population. In fact, the four counties with the highest percentages of Hispanic residents are rural counties. Sullivan County (18.3 percent) in northern Missouri and McDonald County (11.2 percent) in southwestern Missouri are the only two counties in the state that have over 10 percent of their population identified as Hispanic.

Although rural Missouri is not as racial diverse as urban Missouri, challenges such as language barriers and cultural differences still exist. According to the U.S. Census Bureau's American Community Survey (ACS) estimates, 79,086 (3.9 percent) of rural Missouri residents speak a language other than English. Of that subgroup, 32,877 (41.6 percent) do not speak English "very well."

**Population by Race
Missouri, 2012**



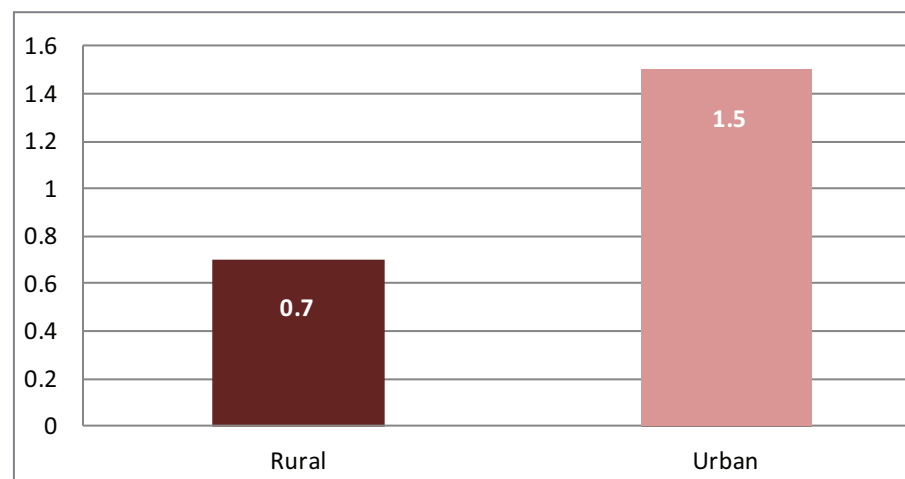
Source: U.S. Census Bureau

Sexual Orientation

The Missouri Department of Health and Senior Services, in collaboration with the Missouri Foundation for Health, developed the Missouri County-Level Study⁸ to produce county-specific estimates for many health risk factors and associated conditions; this study also includes questions related to sexual orientation. The 2011 Institute of Medicine Report, *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding* outlined the importance of baseline demographics regarding sexual minorities in an effort to improve the health of this population.

Missourians living in urban areas identify as Gay or Lesbian at double the rate of those living in rural areas (1.5 per 100 residents vs. 0.7 per 100 residents). This rate is similar to national level data reported through the Centers for Disease Control and Prevention (CDC).⁹

**Sexual Orientation: Consider Self Gay or Lesbian
Missouri 2011**



Estimates per 100 Residents
Source: Missouri County-Level Study

⁸See the Glossary for a description of the Missouri County-Level Study.

⁹Chandra A, Copen CE, Mosher WD. *Sexual Behavior, Sexual Attraction, and Sexual Identity in the United States: Data from the 2006–2010 National Survey of Family Growth*. International Handbooks of Population, International Handbook on the Demography of Sexuality.

Volume VI: Springer Science and Business Media Dordrecht, 2013:45-66. Accessed 2013, September 23 from http://www.cdc.gov/nchs/nsfg/key_statistics/s.htm#sexualorientation

Income and Poverty

Socioeconomic characteristics, such as poverty and unemployment, directly influence the health status of a community or region.^{10,11,12} Low income and poverty limit a person's ability to pay for a variety of goods and services related to health, such as fees related to doctors visits, healthy foods, and medications.

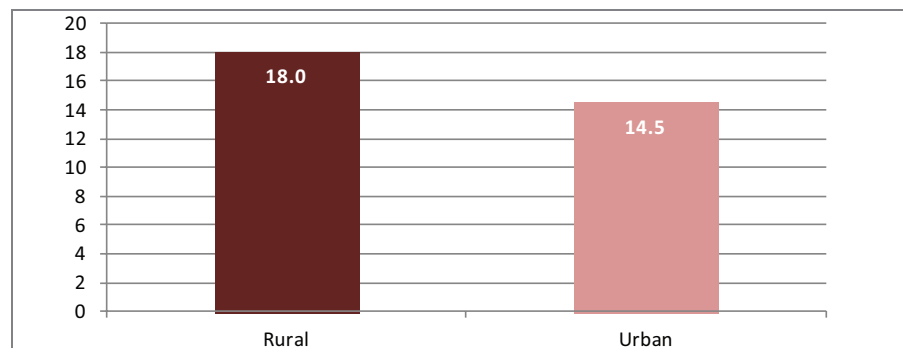
Per capita income (or income per person) can be used to measure relative wealth across the state. The average per capita income of Missouri's rural counties (\$29,984) is 26.6 percent less than that of urban counties (\$40,838).¹³

In 2011, the poverty rate for rural residents was 18.0 percent, which is 24.1 percent higher than the urban poverty rate of 14.5%.¹⁴

The five counties with the highest poverty rates are all rural and located in the south central or southeastern part of the state. Mississippi County and Pemiscot County are the highest with just over 30 percent of residents living below the poverty level. Of the 14 counties with poverty rates higher than 25 percent, all but one (St. Louis City) are classified as rural.

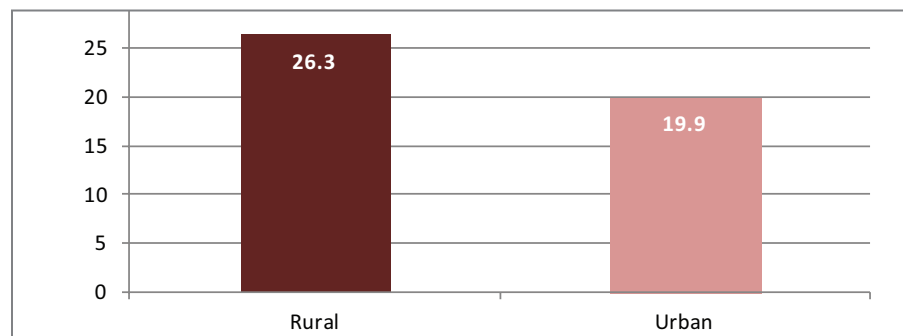
For persons under age 18, the poverty rate in rural counties is 26.3 percent, which is 32.2 percent higher than the urban county rate of 19.9 percent. There are 8 counties, all rural, with youth poverty rates above 40 percent. The highest rates are found in Shannon (45.4 percent), Pemiscot (44.3 percent), and Dunklin (44.2 percent), all of which are located in the Southeast Missouri.

**Percentage of Residents in Poverty
Missouri, 2011**



Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)

**Percentage of Residents Under Age 18 in Poverty
Missouri, 2011**



Source: U.S. Census Bureau, Small Area Income and Poverty Estimates (SAIPE)

¹⁰Murray, S. (2006, March 28). Poverty and health. *Canadian Medical Association Journal*, 174(7), 923. Accessed 2012, October 29, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/>. doi: 10.1503/cmaj.060235

¹¹Rice, S. (2006, August 29). Poverty and poor health are intertwined, experts say. *CNN Health*. Accessed 2012, October 29, from http://articles.cnn.com/2006-08-29/health/poverty.health_1_health-insurance-poverty-health-care?_s=PM:HEALTH.

¹²Strully, K.W. (2009, May). *Job loss and health in the U.S. labor market*. Demography 46(2), 221-246. Accessed 2012, October 29, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2831278/>.

¹³Missouri Department of Economic Development, Missouri Economic and Research Information Center (MERIC). 2010 county per capita personal income. Accessed 2013, September 16, from <http://www.missourieconomy.org/indicators/wages/pci10county.stm>.

¹⁴U.S. Census Bureau. *Small area income and poverty estimates*. Accessed 2013, September 16, from <http://www.census.gov/did/www/saie/data/interactive/#>.

Unemployment

According to May 2013 figures for unemployment, overall rates are roughly equal for urban and rural counties (estimated at 6.7 percent for rural counties and 6.6 percent for urban counties). However, of the 15 counties with unemployment rates above 8.0 percent, all but one (St. Louis City) are rural. The highest unemployment rates among all counties are found in Hickory (11.8 percent) and Reynolds (9.8 percent).¹⁵

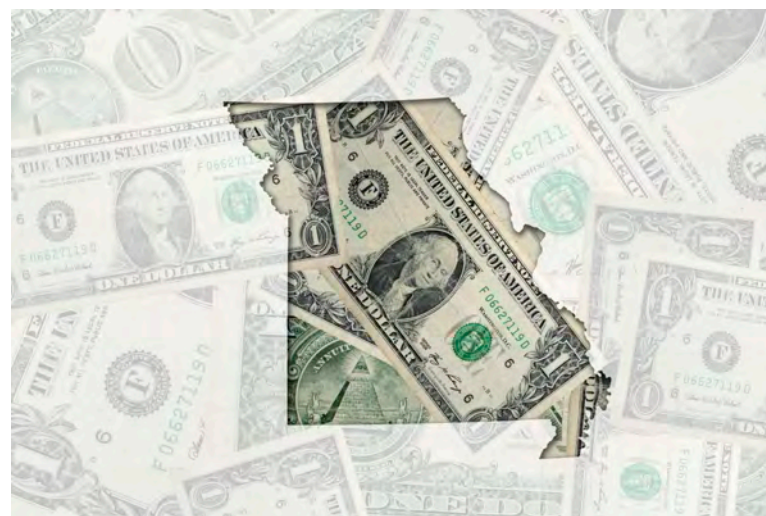
Selected Rural and Urban Counties' Unemployment Rates Missouri, May 2013

| | | | | |
|---------|--------------------|------|-----------------------------|-----|
| Highest | Hickory | 11.8 | St. Louis City | 9.1 |
| | Reynolds | 9.8 | Jackson | 7.7 |
| | Shannon/Washington | 9.4 | Jefferson | 6.9 |
| Lowest | Worth | 4.1 | Boone | 4.7 |
| | Scotland | 4.5 | Cole | 5.2 |
| | Knox/Mercer | 4.7 | Buchanan/Greene/St. Charles | 5.6 |

Source: Missouri Economic Research and Information Center (MERIC)
Rates per 100 Residents
Not seasonally adjusted

Lack of Health Insurance

Health insurance status is tied to several other socioeconomic indicators. Research indicates that persons without health insurance are less likely to receive screenings for chronic medical conditions and have high death rates for diseases such as diabetes, hypertension, and coronary heart disease.¹⁶ According to the U.S. Census Bureau's Small Area Health Insurance Estimates (SAHIE), a higher percentage of rural Missouri residents below age 65 lack health insurance compared to urban residents (17.2 percent versus 14.2 percent). The counties with the highest rates of uninsured residents are almost all rural. Of the 22 counties with uninsured rates of 20 percent or higher, all but one (Jasper County) are rural.



¹⁵Missouri Department of Economic Development, Missouri Economic Research and Information Center (MERIC). (2013, May). *Missouri local area unemployment statistics (LAUS)*. Accessed 2013, July 17, from <http://www.missourieconomy.org/indicators/laus/default.aspx>.

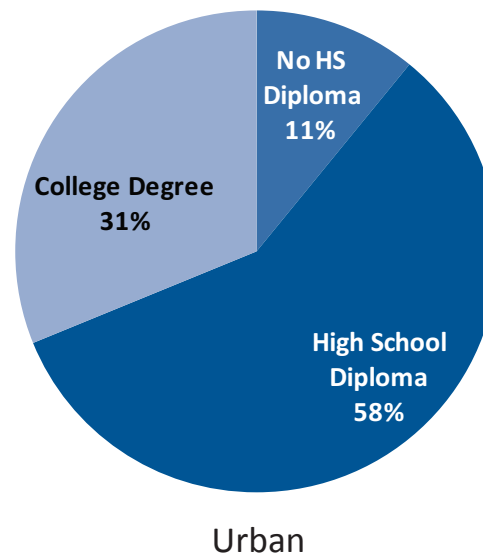
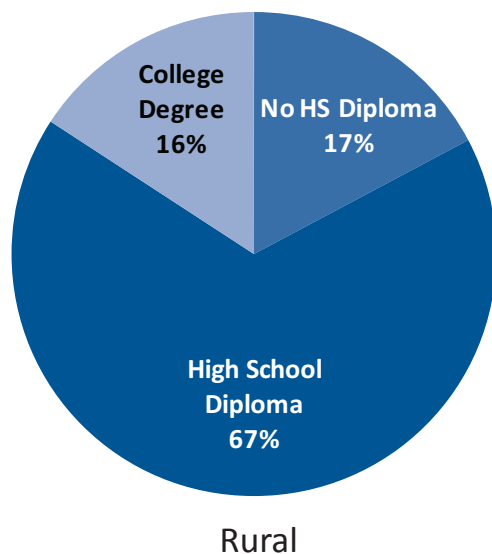
¹⁶Brooks, E.L., Preis, S.R., Hwang, S., Murabito, J.M., Benjamin, E.J., Kelly-Hayes, M., . . . Levy, D. (2010, August). Health insurance and cardiovascular disease risk factors. *American Journal of Medicine* 123(8), 741-747. Accessed 2013, September 9, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2913281/>.

Lack of Education

Low levels of education may be associated with poorer health status. Research shows that persons with lower levels of education are at higher risk for developing cardiovascular-associated risk factors.¹⁷

Data from the U.S. Census Bureau indicate that rural Missourians are less likely to hold a high school diploma compared to urban Missourians (82.8 percent of adults ages 25 and older for rural versus 89.1 percent for urban). Rural residents are also approximately half as likely to hold a college degree as urban residents (15.8 percent for rural versus 31.2 percent for urban).

Education Levels*
Missouri, 2007-2011



*Residents Ages 25 and Over

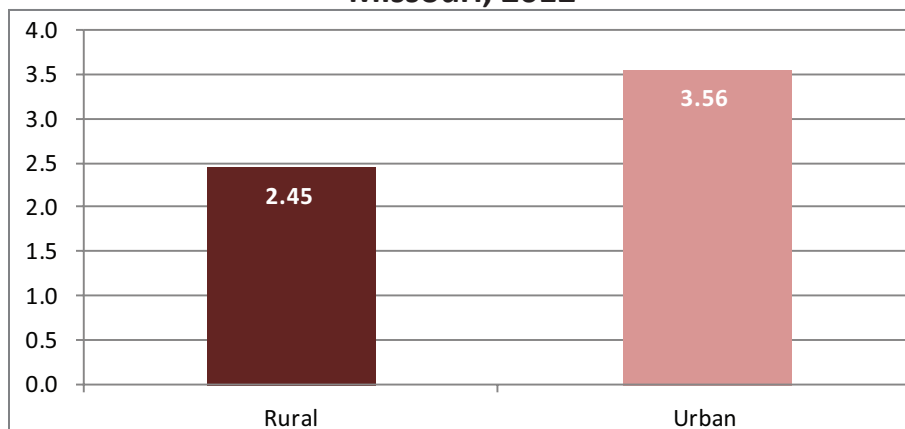
Source: U.S. Census Bureau, American Community Survey

¹⁷Winkleby, M.A., Jatulis, D.E., Frank, E., & Fortmann, S.P. (1992, June). Socioeconomic status and health: How education, income, and occupation contribute to risk factors for cardiovascular disease. *American Journal of Public Health* 82(6), 816-820. Accessed 2013, September 9, from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1694190/>.

Crime

Rural areas do fare better than their urban counterparts in the area of crime. A total of 56,933 property crimes were committed in rural counties in 2012, for a rate of 2.45 property crimes per 100 persons. This is 31.2 percent lower than the property crime rate of 3.56 for urban counties.¹⁸

**Property Crime Rates
Missouri, 2012**

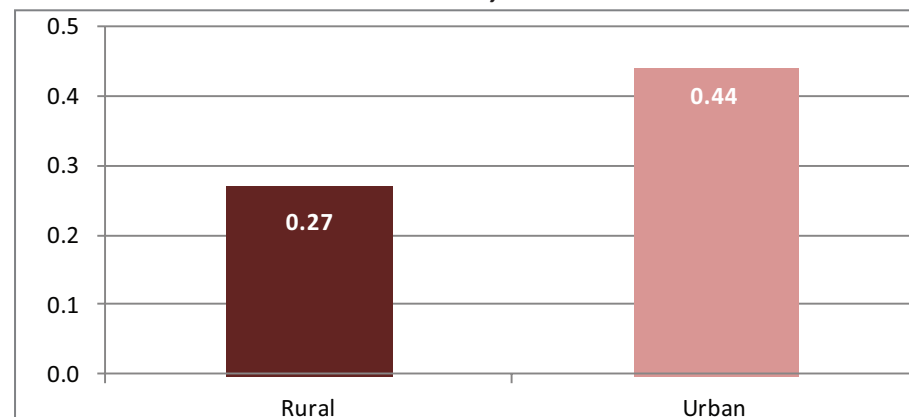


Rates per 100 Residents

Source: Missouri State Highway Patrol, Uniform Crime Reporting System

The urban-rural difference is slightly greater for violent crimes. A total of 6,320 violent crimes were committed in rural counties in 2012, a rate of 0.27 crimes per 100 rural persons. This is 38.6 percent lower than the violent crime rate of 0.44 for urban counties.

**Violent Crime Rates
Missouri, 2012**



Rates per 100 Residents

Source: Missouri State Highway Patrol, Uniform Crime Reporting System

¹⁸Missouri State Highway Patrol Statistical Analysis Center. Uniform crime reporting (UCR) statistical analysis website. Accessed 2013, June 6, from http://www.msHP.dps.mo.gov/MSHPWeb/SAC/data_and_statistics_uCR.html.

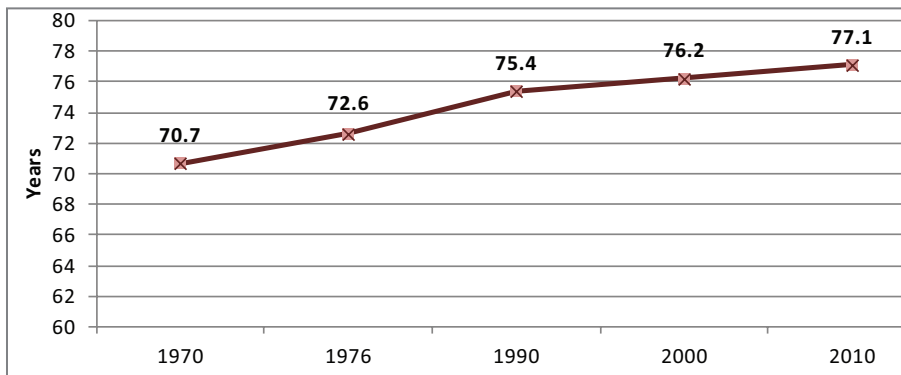
HEALTH STATUS

Life Expectancy

A good measure of the overall health of an area is life expectancy at birth, which is calculated using birth, death, and population data. Throughout the nation, average life expectancy has steadily increased. In Missouri, average life expectancy at birth (based on data for 2006-2010) is now 77.1 years, an increase from 75.4 years in 1990 and from 76.2 years in 2000.

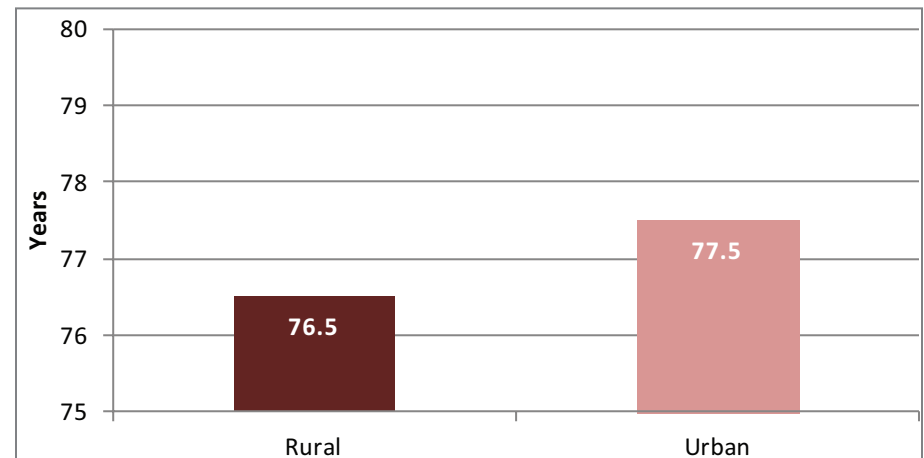
While most Missouri counties have experienced increases in life expectancy during the past two decades, disparities remain for some counties across the state and between urban and rural areas. The 2006-2010 life expectancy at birth for Missouri's urban areas is 77.5 years compared to 76.5 years for its rural areas.

**Life Expectancy at Birth
Missouri, 1970-2010**



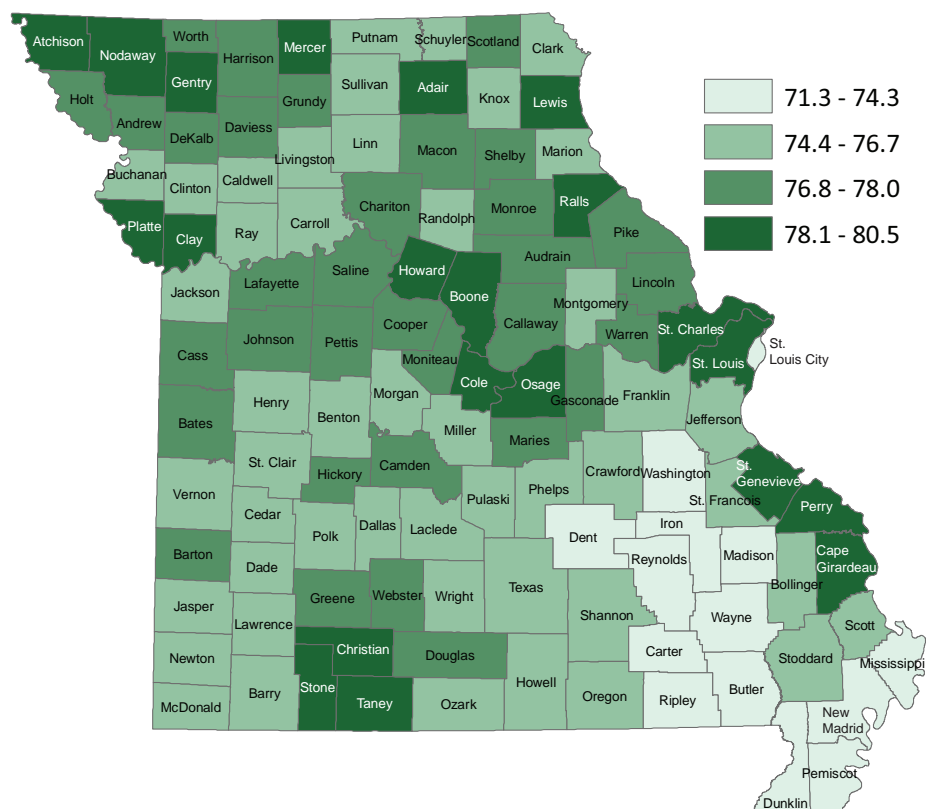
Source: Bureau of Health Care Analysis and Data Dissemination

**Life Expectancy at Birth
Missouri, 2006-2010**



Source: Bureau of Health Care Analysis and Data Dissemination

Years of Life Expectancy at Birth Missouri, 2006-2010



Mercer County has the highest life expectancy at 80.5 years; Pemiscot County has the lowest, at 71.3 years. The Southeast BRFSS Region, which does not include any urban counties, has the lowest regional life expectancy of 75.2 years. The three rural counties with the longest life expectancy estimates are located in the northern part of the state. All of the counties in the lowest life expectancy range are contiguous to each other in the southeast part of the state.

Selected Rural and Urban Counties' Life Expectancy at Birth Missouri, 2006-2010

| | Rural | Years | Urban | Years |
|---------|----------|-------|----------------|-------|
| Highest | Mercer | 80.5 | Platte | 80.1 |
| | Ralls | 79.3 | St. Charles | 80.1 |
| | Nodaway | 79.2 | Boone | 79.4 |
| Lowest | Pemiscot | 71.3 | St. Louis City | 73.1 |
| | Carter | 71.9 | Jefferson | 76.0 |
| | Ripley | 72.0 | Jackson | 76.2 |

Source: Bureau of Health Care Analysis and Data Dissemination

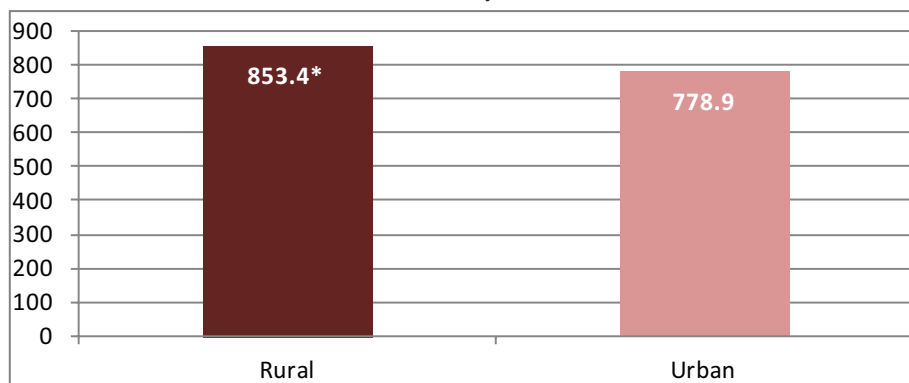
Source: Bureau of Health Care Analysis and Data Dissemination

Note: On the bar charts in the remainder of this report, asterisks are used to indicate if either the rural or urban rate is statistically significantly high compared to the other geography. Selected graphs also include a reference line for the Healthy People 2020 nationwide targets. See the Glossary for a description of statistical significance and Healthy People 2020.

Deaths by All Causes¹⁹

A total of 55,599 Missouri residents died during 2011, resulting in an age-adjusted death rate from all causes of 808.1 deaths for every 100,000 residents. The rural death rate of 853.4 is nearly 10 percent higher than the urban death rate of 778.9, which is a statistically significant difference.

**Death Rates from All Causes
Missouri, 2011**

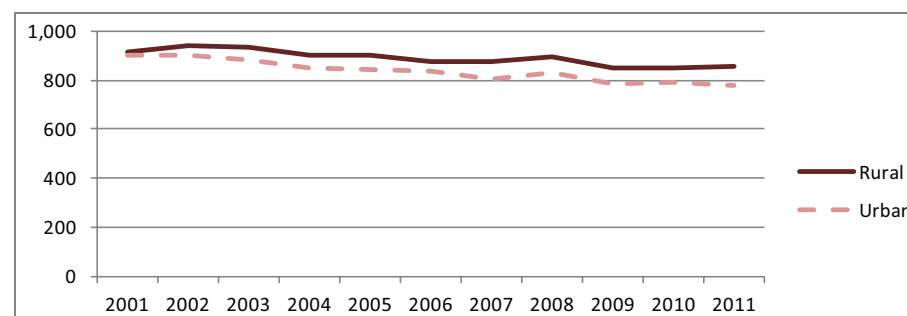


Age-Adjusted Rates per 100,000 Residents

The annual death rates from all causes decreased significantly for both rural and urban areas between 2001 and 2011. However, the urban rate decreased faster than the rural rate, causing a growing disparity. Although the rural and urban rates were similar and not significantly different in 2001, the rural rate was significantly higher than the urban rate in all subsequent years.

Rural death rates from all causes are statistically significantly higher than urban rates across both genders and for all age groups except Under 15. The rural death rate for residents Under 15 is slightly higher than the urban rate, but the difference is not statistically significant. (Death rates are available in Appendix B.)

**Death Rates from All Causes
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

¹⁹The data in the remainder of this chapter were collected from the Missouri Information for Community Assessment (MICA) system unless otherwise specified. All death data were collected from the Death MICA. Unintentional injury and motor vehicle accident hospitalization data were collected from the Injury MICA. Alzheimer's disease hospitalization data were prepared by the Bureau of Health Care Analysis and Data Dissemination. All other hospitalization data were collected from the Inpatient Hospitalization MICA. See Appendix A for more information on the MICA system.

The three counties with the highest rural death rates from all causes are located in the Southeast BRFSS Region. The counties with the lowest rates are located in the Northeast and Northwest BRFSS Regions.²⁰

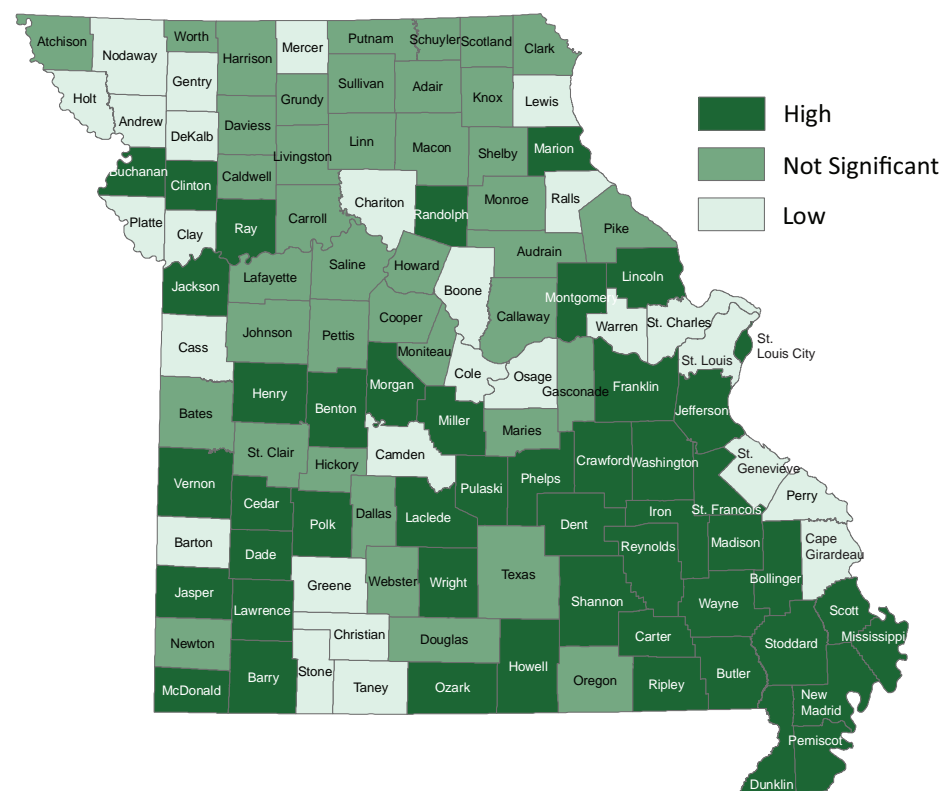
Selected Rural and Urban Counties' All Causes Death Rates Missouri, 2001-2011

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|---------|--------|---------|----------------|--------|---------|
| Highest | Iron | 1,724 | 1,148.3 | St. Louis City | 38,601 | 1,062.1 |
| | Dunklin | 4,923 | 1,130.2 | Jefferson | 18,341 | 969.9 |
| | Carter | 864 | 1,111.7 | Jasper | 12,257 | 932.8 |
| Lowest | Mercer | 451 | 711.1 | Platte | 5,741 | 702.0 |
| | Ralls | 932 | 741.1 | St. Charles | 21,913 | 723.1 |
| | Nodaway | 2,107 | 743.1 | Boone | 9,889 | 743.6 |

Age-Adjusted Rates per 100,000 Residents

Most of the counties with significantly high rates compared to the state are located in the southern half of Missouri.

Deaths from All Causes Missouri, 2001-2011



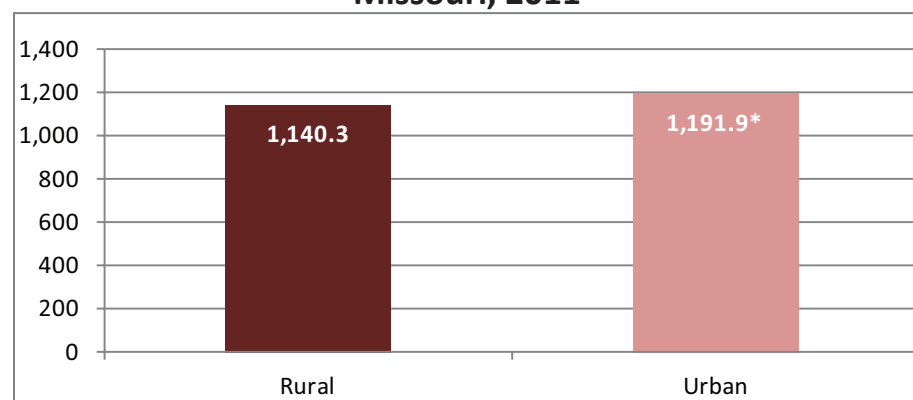
Based on Age-Adjusted Rates per 100,000 Residents

²⁰See the Glossary description of Unstable Rates for an explanation of the use of multi-year death and hospitalization rates.

Hospitalization

Although rural residents generally have higher death rates, urban residents tend to have higher hospitalization rates. In 2011, the urban rate for all diagnoses is 1,191.9 hospitalizations per every 10,000 residents; this is significantly higher than the rural rate of 1,140.3.

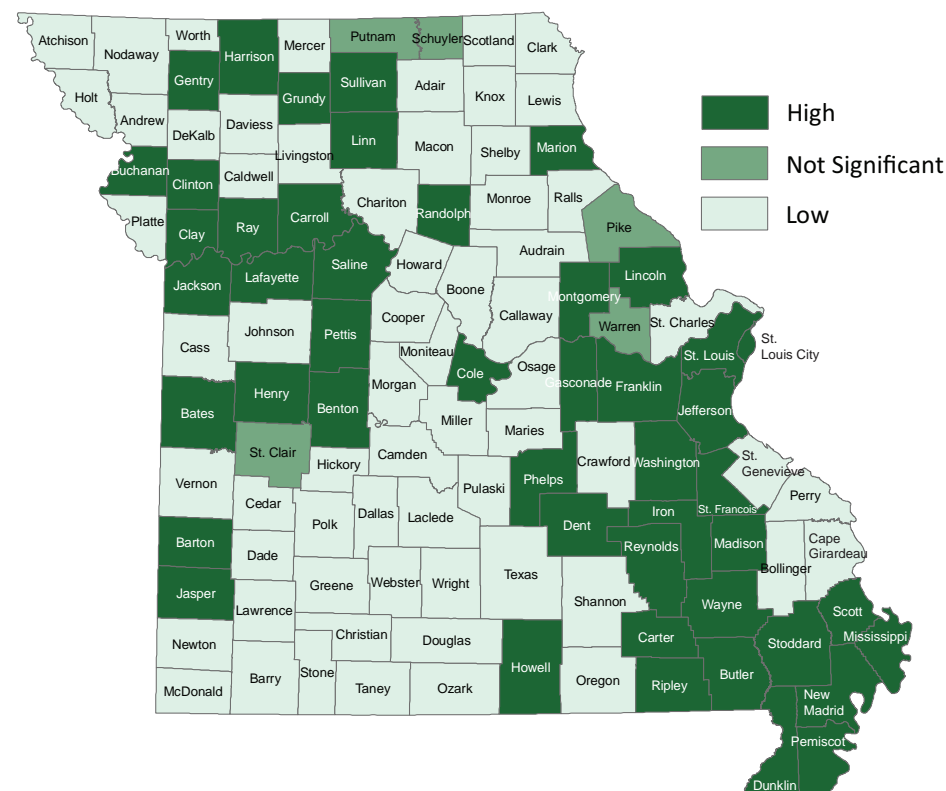
**Hospitalization Rates for All Diagnoses
Missouri, 2011**



Age-Adjusted Rates per 10,000 Residents

The significance map of hospitalizations for all diagnoses differs greatly from the significance map of deaths from all causes. While the majority of the counties with significantly higher death rates are located in the southern part of the state, most of the counties with significantly higher hospitalization rates are clustered towards the eastern and western borders.

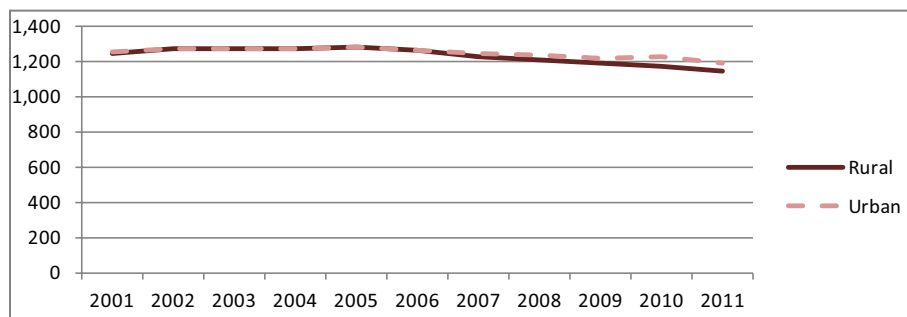
**Hospitalizations for All Diagnoses
Missouri, 2007-2011**



Based on Age-Adjusted Rates per 10,000 Residents

Like deaths, hospitalizations declined between 2001 and 2011. Through 2006, hospitalization rates for rural and urban residents were similar, but since that time a small gap has emerged between the rural and urban rates.

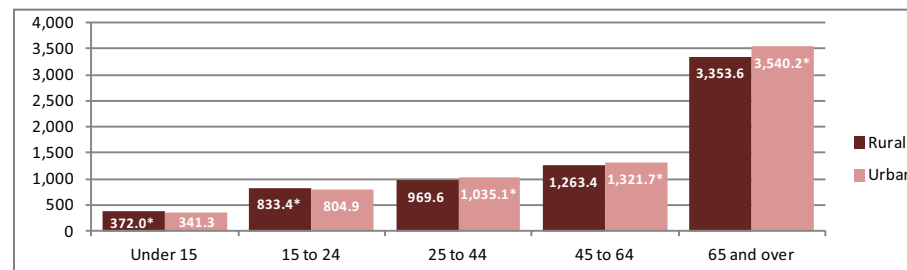
Hospitalization Rates for All Diagnoses Missouri, 2001-2011



Age-Adjusted Rates per 10,000 Residents

Hospitalization rates increase with age. Rural rates are significantly higher for the younger age groups of Under 15 and 15 to 24 but significantly lower for the remaining older age groups.

Hospitalization Rates for All Diagnoses Missouri, 2007-2011

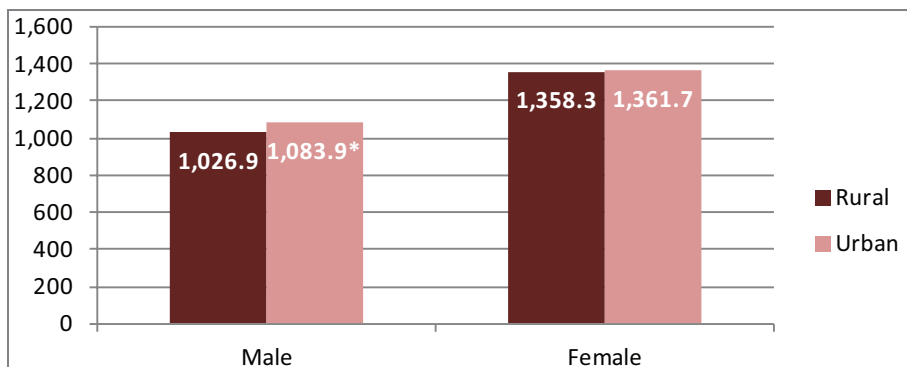


Age-Adjusted Rates per 10,000 Residents

(Hospitalization rates are available in Appendix C.)

Female hospitalization rates are significantly higher than male rates in both rural and urban areas. Among males, rural rates are significantly lower, while there is no statistically significant difference between female rural and urban rates.

Hospitalization Rates for All Diagnoses Missouri, 2007-2011



Age-Adjusted Rates per 10,000 Residents



Leading Causes of Death and Hospitalization

The leading causes of death for both rural and urban Missourians are similar, with heart disease and cancer responsible for approximately half of all deaths in each location. However, rural rates are statistically significantly higher than urban rates for all causes and for each of the leading causes except diabetes.

Leading Causes of Rural and Urban Deaths Missouri, 2001-2011

| Rank | Rural | | | Urban | | |
|------|-----------------------------------|---------|-------|-----------------------------------|---------|-------|
| | Cause | Number | Rate | Cause | Number | Rate |
| | <i>All causes</i> | 253,255 | 889.8 | <i>All causes</i> | 349,683 | 836.0 |
| 1 | Heart Disease | 71,528 | 246.4 | Heart Disease | 92,825 | 220.3 |
| 2 | Cancer | 56,874 | 197.6 | Cancer | 79,523 | 190.6 |
| 3 | Chronic Lower Respiratory Disease | 15,914 | 54.7 | Stroke | 20,859 | 49.7 |
| 4 | Stroke | 15,887 | 54.5 | Chronic Lower Respiratory Disease | 18,829 | 45.6 |
| 5 | Unintentional Injuries | 13,482 | 54.7 | Unintentional Injuries | 17,417 | 42.4 |
| 6 | Alzheimer's Disease | 7,647 | 25.8 | Alzheimer's Disease | 9,903 | 23.4 |
| 7 | Pneumonia and Influenza | 6,941 | 23.8 | Diabetes | 9,525 | 22.8 |
| 8 | Diabetes | 6,701 | 23.3 | Pneumonia and Influenza | 8,645 | 20.5 |
| 9 | Kidney Disease | 5,592 | 19.2 | Kidney Disease | 7,133 | 17.0 |
| 10 | Suicide | 3,437 | 14.4 | Suicide | 5,150 | 12.6 |

Age-Adjusted Rates per 100,000 Residents

Death data are ranked using a method developed by the National Center for Health Statistics (NCHS). No similar ranking method exists for hospitalization data, and hospital diagnosis categories do not always match death classification categories. However, rural and urban data can be compared for specific hospital diagnoses.

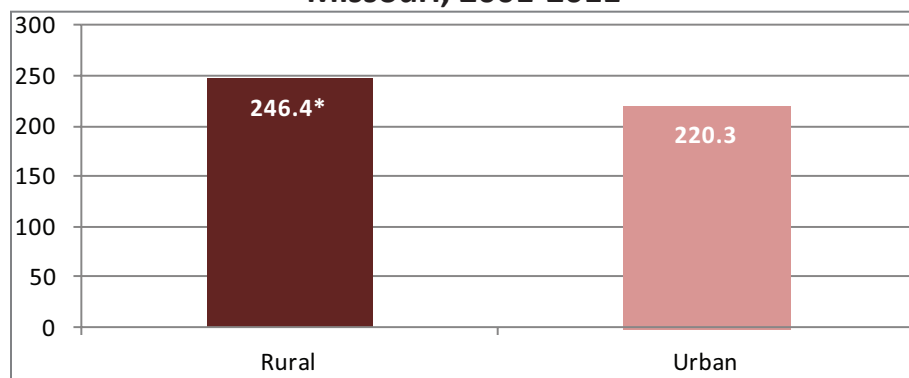
The following sections are arranged in order of the leading causes of rural death and provide both death and hospital data, when available. Additional sections on hospitalizations due to affective disorders, alcohol- and substance-related mental disorders, and septicemia are also included, as these diagnoses cause large numbers of hospitalizations for both rural and urban Missourians.



Heart Disease

Heart disease includes a large class of conditions affecting the cardiovascular system and is a major cause of deaths and hospitalizations. In fact, it is the number one cause of death for both rural and urban Missourians. The 2001-2011 heart disease death rate of 246.4 per 100,000 rural residents is 11.8 percent higher than the 220.3 rate for urban residents, which is statistically significant.

**Death Rates from Heart Disease
Missouri, 2001-2011**

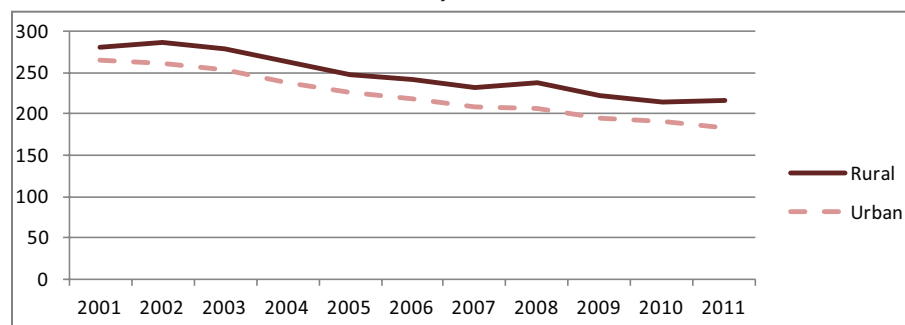


Age-Adjusted Rates per 100,000 Residents



Over the past decade, heart disease death rates decreased for both rural and urban areas, but the gap between the rural and urban rates nearly doubled from 2001 through 2011.

**Death Rates from Heart Disease
Missouri, 2001-2011**

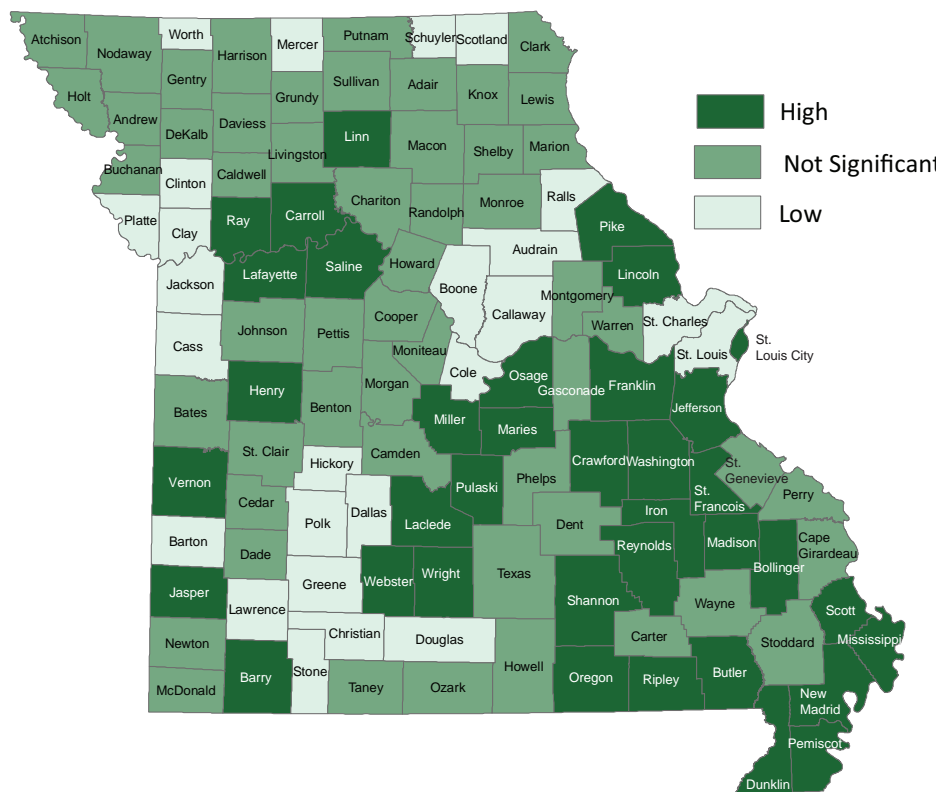


Age-Adjusted Rates per 100,000 Residents

For the 2001-2011 time period, 42 rural counties have heart disease death rates that are statistically significantly higher than the state rate. In general, the highest heart disease death rates are found in southern Missouri, with large clusters of significantly high rates also appearing in the south central and southeastern parts of the state.

The three counties (all rural) with the highest heart disease death rates are found in the Southeast BRFSS Region.

Deaths from Heart Disease Missouri, 2001-2011



Selected Rural and Urban Counties' Heart Disease Death Rates Missouri, 2001-2011

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|-------------|--------|-------|----------------|--------|-------|
| Highest | Washington | 997 | 413.7 | St. Louis City | 10,964 | 299.5 |
| | Mississippi | 727 | 386.1 | Jasper | 3,784 | 285.7 |
| | Pemiscot | 879 | 366.9 | Jefferson | 4,912 | 269.4 |
| Lowest | Schuyler | 112 | 152.0 | Platte | 1,311 | 162.1 |
| | Scotland | 137 | 167.6 | Boone | 2,238 | 170.4 |
| | Worth | 86 | 170.9 | Clay | 3,527 | 175.6 |

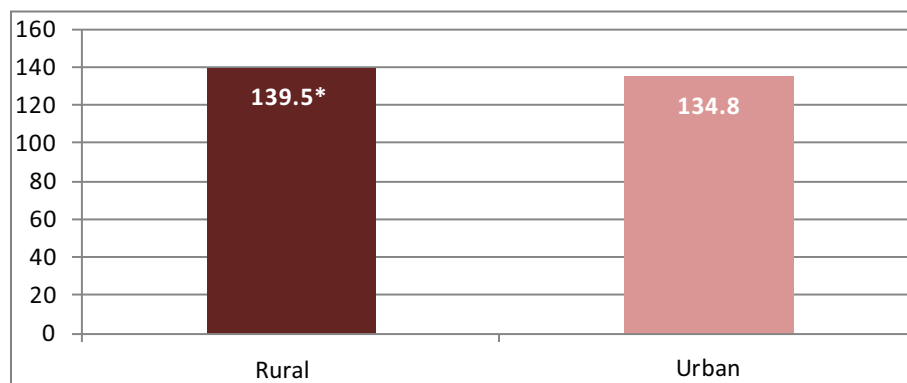
Age-Adjusted Rates per 100,000 Residents

Based on Age-Adjusted Rates per 100,000 Residents



The 2007-2011 rural hospitalization rate for heart disease is 139.5 per 10,000 residents, which is 3.5 percent higher than the urban rate of 134.8. The difference between the urban and rural rates is statistically significant.

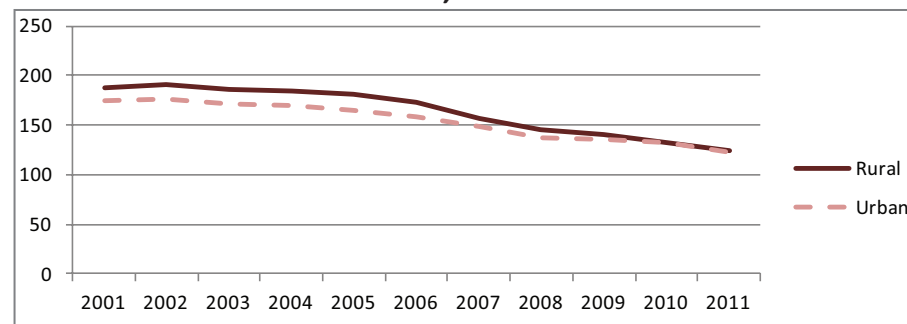
Hospitalization Rates for Heart Disease Missouri, 2007-2011



Age-Adjusted Rates per 10,000 Residents

Between 2001 and 2011, heart disease hospitalization rates declined for both rural and urban residents. However, the rural rate experienced greater declines. In fact, the urban rate slightly exceeded the rural rate in 2010 (132.8 versus 132.5). As a result of these trends, the differences between the rural and urban 2010 and 2011 hospitalization rates are not statistically significant.

Hospitalization Rates for Heart Disease Missouri, 2001-2011



Age-Adjusted Rates per 10,000 Residents

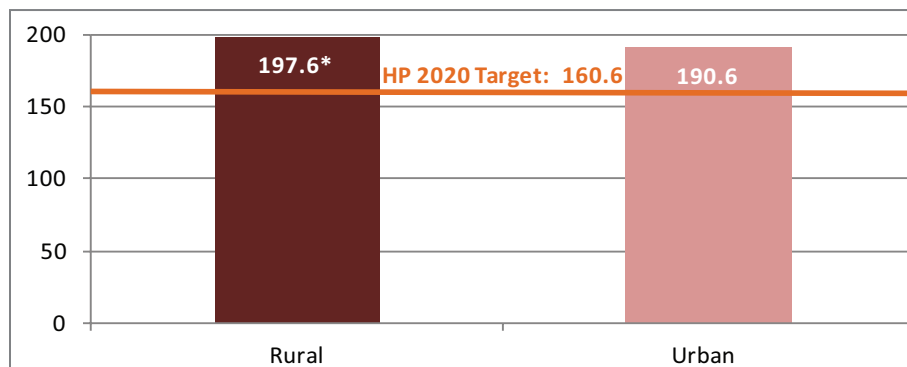
Between 2001 and 2011, heart disease hospitalization rates declined for both rural and urban residents.



Cancer

The second leading cause of death for both rural and urban Missourians is cancer. The rural cancer death rate of 197.6 per 100,000 residents is significantly higher than the urban rate of 190.6. Both the rural and the urban rates exceed the Healthy People 2020 target rate of 160.6.

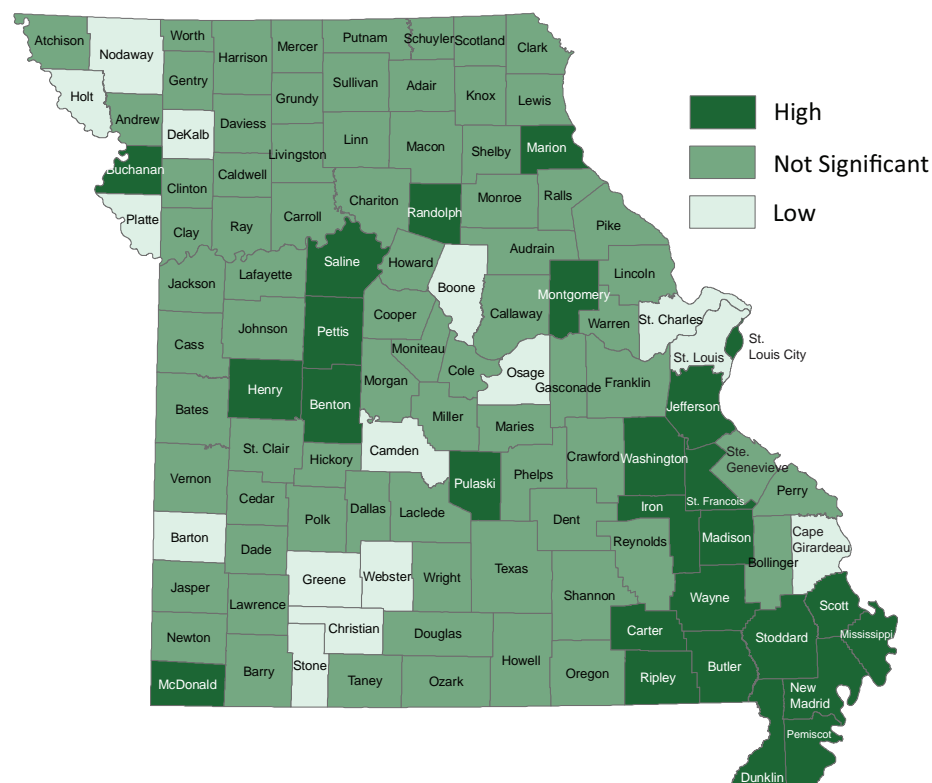
**Death Rates from Cancer
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

Counties with significantly high cancer death rates compared to the state tend to be located in the southeastern and west central areas of Missouri.

**Deaths from Cancer
Missouri, 2001-2011**



Based on Age-Adjusted Rates per 100,000 Residents

The three counties (all rural) with the highest cancer death rates are located in the Southeast BRFSS Region. The three counties (all rural) with the lowest cancer death rates are found in the Central and Northwest BRFSS Regions.

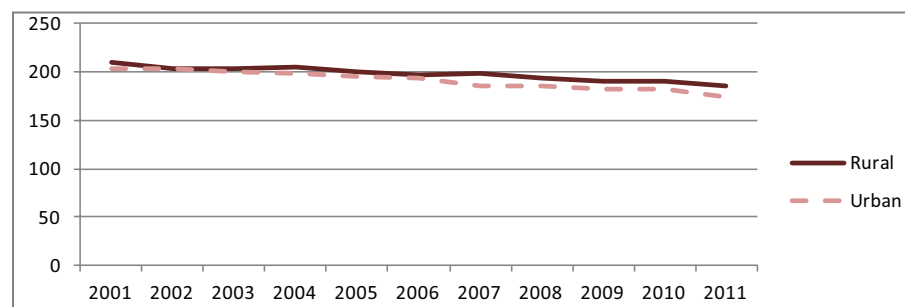
Selected Rural and Urban Counties' Cancer Death Rates Missouri, 2001-2011

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|-------------|--------|-------|----------------|--------|-------|
| Highest | Carter | 213 | 254.4 | St. Louis City | 8,299 | 234.6 |
| | Mississippi | 458 | 249.0 | Jefferson | 4,343 | 212.3 |
| | Wayne | 529 | 238.8 | Buchanan | 2,232 | 203.7 |
| Lowest | Holt | 142 | 155.4 | Platte | 1,414 | 167.4 |
| | Osage | 275 | 159.3 | St. Charles | 5,558 | 174.8 |
| | Camden | 1,092 | 164.6 | Boone | 2,316 | 177.7 |

Age-Adjusted Rates per 100,000 Residents

Cancer death rates in both rural and urban areas of Missouri decreased significantly from 2001 to 2011, by 11.3 and 14.7 percent, respectively. The rural rate remained higher than the urban rate throughout this time period, with the gap between the rates more than doubling.

Death Rates from Cancer Missouri, 2001-2011



Age-Adjusted Rates per 100,000 Residents



The following table ranks cancer deaths by cancer type for both rural and urban areas. The overall order is the same for both groups, but certain types of cancers affect rural or urban residents more frequently. For example, rural death rates are higher for lung/bronchus/trachea, colon/rectum/anus, and prostate cancers, while urban death rates are higher for breast and pancreatic cancers. All of the rural/urban rate differences are statistically significant except prostate cancer.

| Leading Causes of Cancer Death Missouri, 2001 - 2011 | Rural | | Urban | |
|---|--------|--------|--------|--------|
| | Count | Rate | Count | Rate |
| 1 Lung/Bronchus/Trachea | 18,387 | 63.3 | 24,042 | 57.9 |
| 2 Colon/Rectum/Anus | 5,667 | 19.7 | 7,437 | 17.8 |
| 3 Breast | 3,738 | 23.9* | 6,236 | 25.9* |
| 4 Pancreas | 3,034 | 10.5 | 4,716 | 11.3 |
| 5 Prostate | 2,653 | 23.2** | 3,394 | 22.0** |

Age-Adjusted Rates per 100,000 Residents

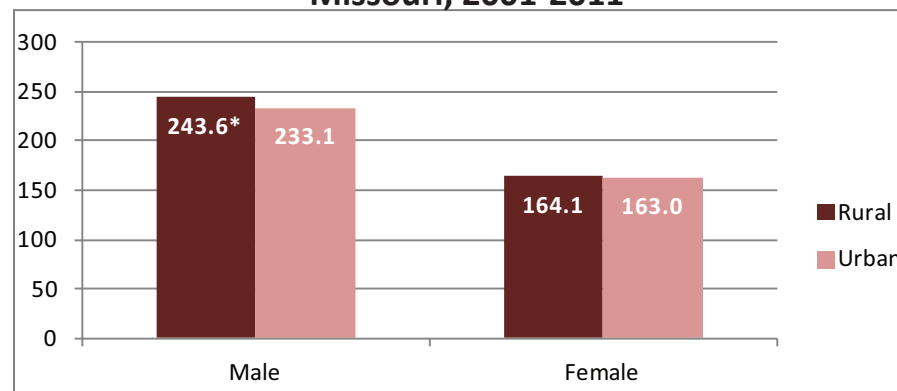
*Breast cancer rates use only the female population.

**Prostate cancer rates use only the male population.

In both rural and urban counties, male cancer death rates are significantly higher than female rates. While rural males have a significantly higher death rate than urban males, there is no statistically significant difference between the rural and urban female rates.



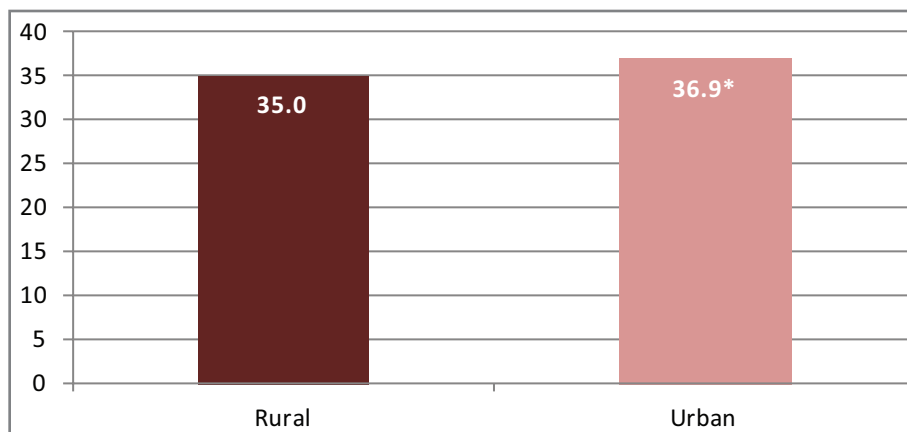
**Death Rates from Cancer
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

The rural cancer death rate is higher than the urban rate, but the cancer hospitalization rate is *lower* for rural residents (35.0 per 10,000 residents versus 36.9). Thus, a higher rate of urban residents receive hospital treatment for cancer, while a higher rate of rural residents die from the disease. The difference between the rural and urban hospitalization rates is statistically significant.

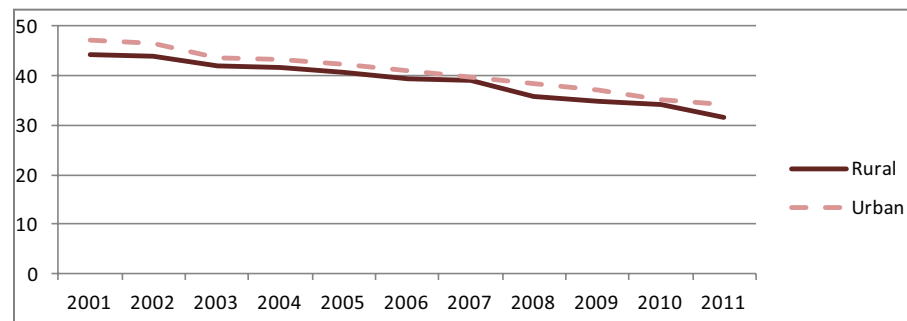
**Hospitalization Rates for Cancer
Missouri, 2007-2011**



Age-Adjusted Rates per 10,000 Residents

Cancer hospitalization rates mirror cancer death rates in that both decreased over the past decade. Rural and urban rates declined by over 25 percent from 2001 through 2011. These declines are statistically significant. The urban cancer hospitalization rate remained slightly higher than the rural rate throughout the decade.

**Hospitalization Rates for Cancer
Missouri, 2001-2011**



Age-Adjusted Rates per 10,000 Residents

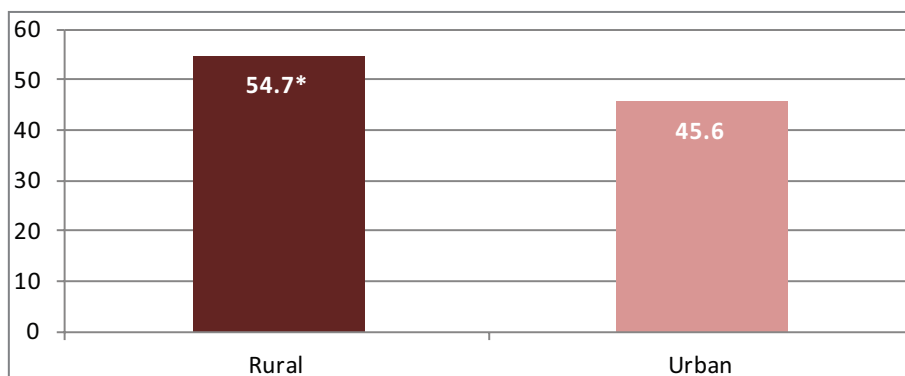


The rural cancer death rate is higher than the urban rate, but the hospitalization rate is lower...

Chronic Lower Respiratory Diseases

Chronic lower respiratory diseases (CLRDs) include chronic obstructive pulmonary disease (COPD), emphysema, asthma, bronchiectasis, non-acute bronchitis, and other forms of chronic airway obstruction.²¹ CLRD is the third leading cause of death in rural Missouri and the fourth leading cause in urban Missouri. The 2001-2011 CLRD death rate for rural Missourians (54.7 per 100,000 residents) is 20.0 percent higher than the urban rate of 45.6, a statistically significant difference.

**Death Rates from CLRD
Missouri, 2001-2011**

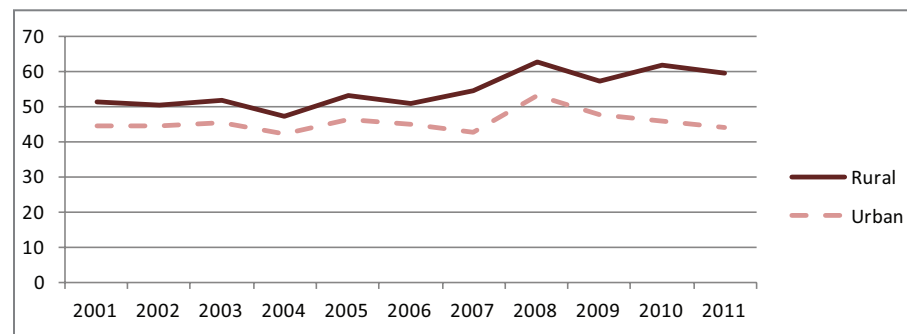


Age-Adjusted Rates per 100,000 Residents



CLRD death rates fluctuated in both rural and urban areas between 2001 and 2011. The gap between rural and urban areas has widened since 2001.

**Death Rates from CLRD
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

²¹Missouri Department of Health and Senior Services. *Leading causes of death profile – Definitions*. Accessed 2013, September 9, from http://health.mo.gov/data/mica/CDP_MICA/CofDDefinitionofIndicators.html#I1.

The rural counties with the highest CLRD death rates are located in the Southeast BRFSS Region of the state.

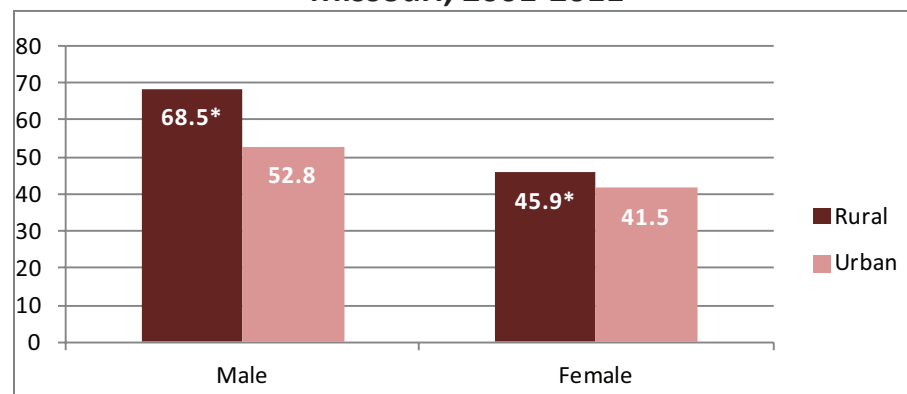
Selected Rural and Urban Counties' CLRD Death Rates Missouri, 2001-2011

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------------|--------|-------|-------------|--------|------|
| Highest | Carter | 84 | 103.2 | Buchanan | 857 | 76.6 |
| | Wayne | 202 | 93.1 | Jasper | 835 | 63.2 |
| | Iron | 133 | 85.1 | Clay | 1,256 | 62.9 |
| Lowest | Chariton | 47 | 29.6 | St. Louis | 4,443 | 33.4 |
| | Barton | 64 | 34.6 | Boone | 505 | 40.5 |
| | Ste. Genevieve | 90 | 36.9 | St. Charles | 1,217 | 41.6 |

Age-Adjusted Rates per 100,000 Residents

Males have significantly higher CLRD death rates in both rural and urban areas. However, the gender disparity in rural areas is much greater than in urban areas, with rural males having a 49.2 percent higher CLRD death rate than rural females. Urban males have only a 27.2 percent higher rate compared to urban females.

Death Rates from CLRD Missouri, 2001-2011



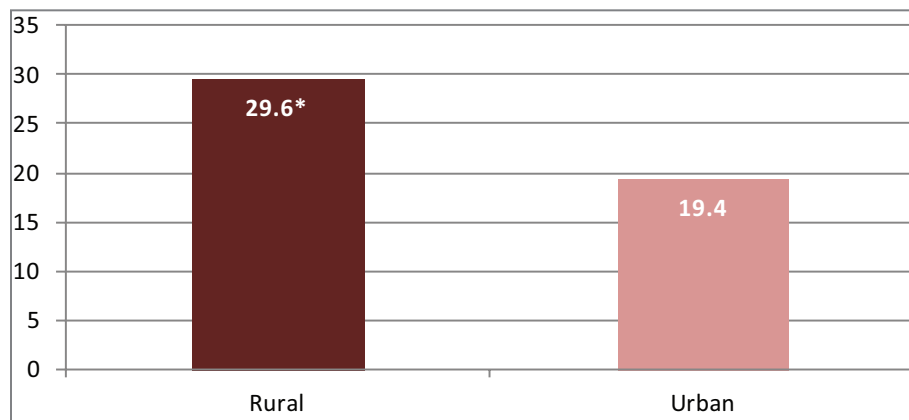
Age-Adjusted Rates per 100,000 Residents



The majority of CLRD hospitalizations are due to COPD and bronchiectasis. As with CLRD deaths, the rural COPD/bronchiectasis hospitalization rate is higher than the urban rate, at 29.6 hospital visits per 10,000 rural residents compared to 19.4 urban. This 52.6 percent difference in rates is statistically significant.

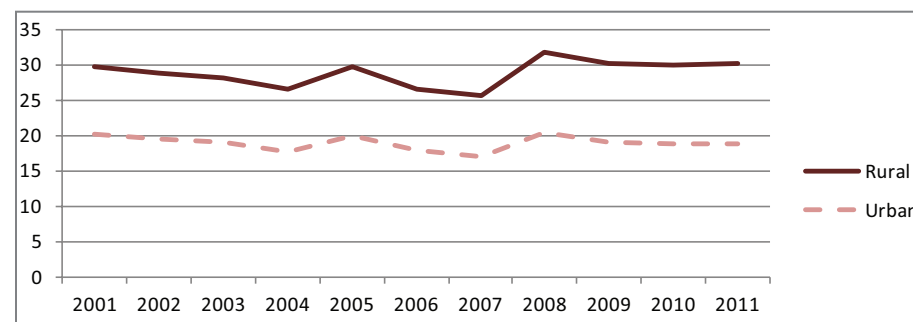
COPD/bronchiectasis hospitalization rates were consistently higher for rural areas throughout the past decade. This disparity slowly increased from 2001, when the rural rate was 46.5 percent higher than the urban rate, to 2011, when the rural rate was 61.0 percent higher.

**Hospitalization Rates for COPD/Bronchiectasis
Missouri, 2007-2011**



Age-Adjusted Rates per 10,000 Residents

**Hospitalization Rates for COPD/Bronchiectasis
Missouri, 2001-2011**

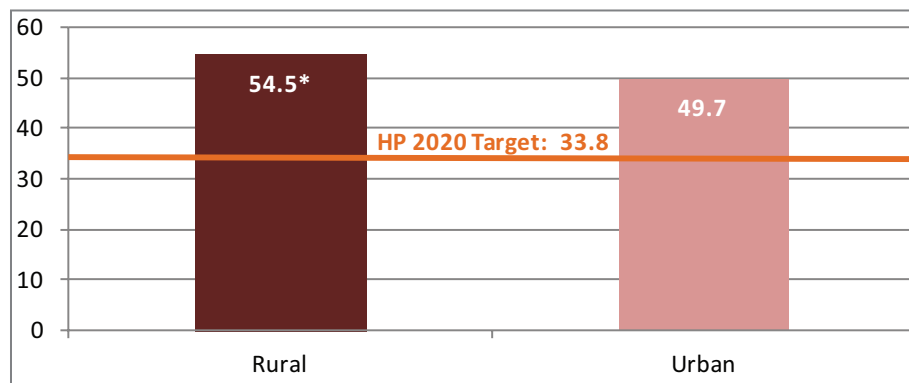


Age-Adjusted Rates per 10,000 Residents

Stroke

While stroke hospitalization and death rates have fallen since 2001, stroke remains the third leading cause of death in Missouri and the fourth leading cause of death for rural residents. In Missouri, the death rate from stroke is higher in rural counties (54.5 per 100,000 rural residents compared to 49.7 for urban residents during the 2001-2011 time period). The difference is statistically significant. Both the rural and the urban rates exceed the Healthy People 2020 target rate of 33.8.

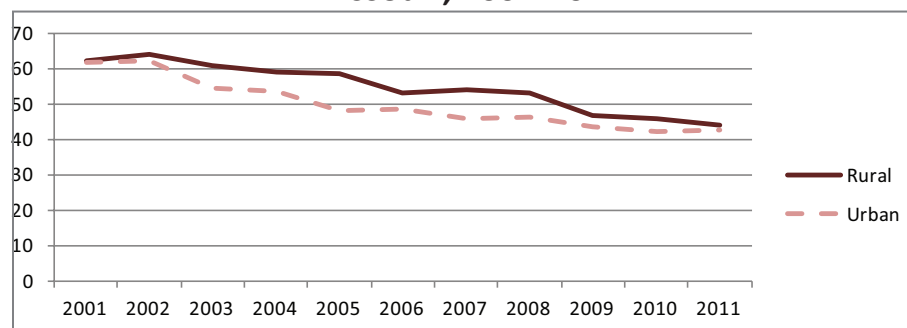
**Death Rates from Stroke
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

Stroke death rates declined between 2001 and 2011 in both rural and urban areas. The rural and urban rates were similar in both 2001 and 2011, but in the intervening years, the rural rate was somewhat higher.

**Death Rates from Stroke
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

The three counties with the highest rural stroke death rates are found in the Southeast, Northeast, and Southwest BRFSS regions. The counties with the three lowest rural rates are adjacent to each other in the north central part of the state, along the Iowa border.

Selected Rural and Urban Counties' Stroke Death Rates Missouri, 2001-2011

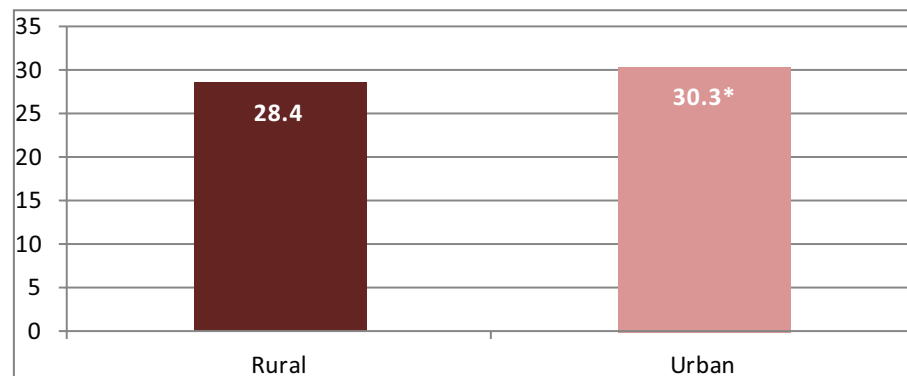
| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------|--------|------|----------------|--------|------|
| Highest | Dunklin | 377 | 83.5 | Buchanan | 813 | 67.3 |
| | Lewis | 120 | 78.5 | Jefferson | 1,061 | 60.8 |
| | Henry | 283 | 74.6 | St. Louis City | 2,211 | 60.2 |
| Lowest | Putnam | 28 | 29.5 | Platte | 293 | 37.2 |
| | Mercer | 27 | 34.6 | St. Charles | 1,110 | 38.8 |
| | Harrison | 62 | 34.8 | Cole | 354 | 43.6 |

Age-Adjusted Rates per 100,000 Residents



Although the rural stroke death rate is significantly higher than the urban stroke death rate, urban residents are hospitalized for stroke at a significantly higher rate than rural residents (30.3 versus 28.4 per 10,000 residents for 2007-2011).

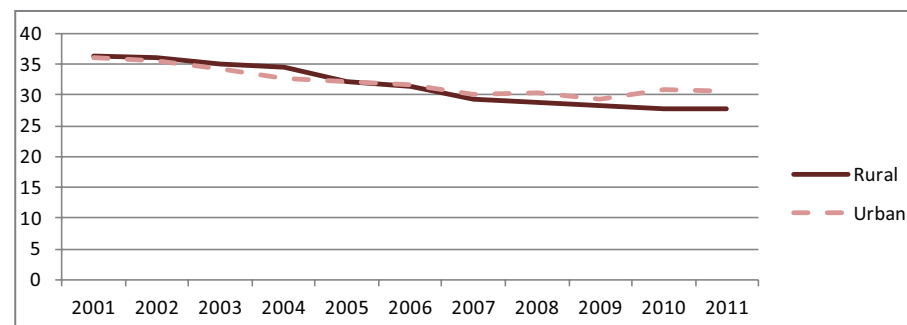
Hospitalizations for Stroke Missouri, 2007-2011



Age-Adjusted Rates per 10,000 Residents

Stroke hospitalization rates decreased for both rural and urban areas between 2001 and 2011, but rural areas experienced slightly larger decreases, as the urban rate plateaued during the last five years. As a result, the gap between the rural and urban rates has been increasing since 2009.

Death Rates from Stroke Missouri, 2001-2011



Age-Adjusted Rates per 10,000 Residents

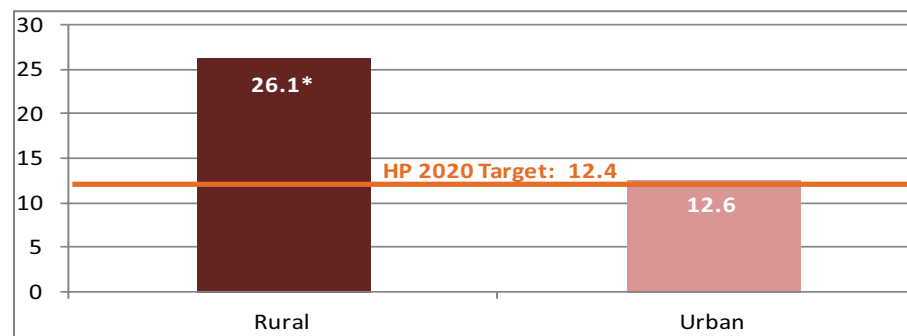
Unintentional Injuries/Motor Vehicle Accidents

The fifth leading cause of death for both rural and urban Missourians is unintentional injuries, a category that includes motor vehicle accidents, falls, drug overdoses, fires, and drownings.²² The rural rate of unintentional injury deaths (54.7 per 100,000 residents for 2001-2011) is statistically significantly higher than the urban rate (42.4). Likewise, rural residents are hospitalized for unintentional injuries at a significantly higher rate (56.1 versus 51.1 per 10,000 residents).

The disparity between rural and urban injuries is especially pronounced for motor vehicle accident (MVA) deaths, a subcategory of unintentional injuries. The rural death rate of 26.1 per 100,000 residents is more than double the urban rate of 12.6. Accidents along the rural roadways of Missouri result in more deaths due to curvier roads, higher driving speeds, lower seatbelt use among certain demographic groups, and lack of health system infrastructure to meet emergency needs.²³

The rural death rate from Motor Vehicle Accidents is more than double the urban rate...

Death Rates from Motor Vehicle Accidents Missouri, 2001-2011



Age-Adjusted Rates per 100,000 Residents



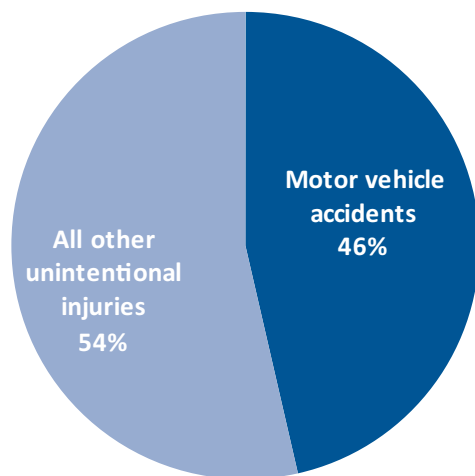
²²Missouri Department of Health and Senior Services. *Leading causes of death profile – Definitions*. Accessed 2013, September 9, from http://health.mo.gov/data/mica/CDP_MICA/CofDDefinitionofIndicators.html#11.

²³National Highway Traffic Safety Administration (NHTSA). (2006, December). *Traffic crashes take their toll on America's rural roads: The need to establish rural safety belt programs*. Accessed 2013, September 16, from www.nhtsa.gov/people/injury/airbags/RuralCrashes.pdf.

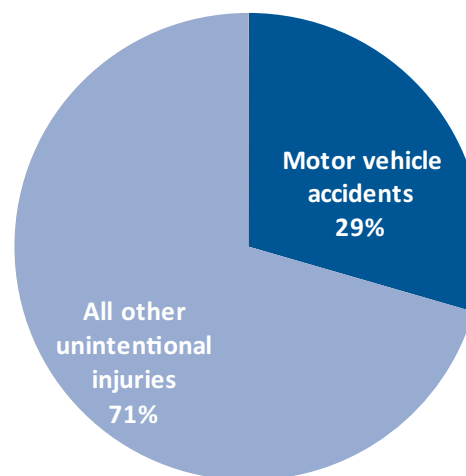
Although MVA deaths declined between 2001 and 2011, nearly half of all rural unintentional injury deaths are due to motor vehicle accidents. In urban areas, MVA deaths are responsible for less than one third of all unintentional injury deaths.

In fact, for more than 75 percent of Missouri's rural counties, MVA death rates are significantly higher than the state rate. Only one rural county, Cape Girardeau, has a significantly low MVA death rate compared to the state overall.

Types of Unintentional Injury Deaths Missouri, 2001-2011



Rural



Urban

The three highest MVA death rates by county are clustered in the south central part of the state. The rates for these three counties are double (or nearly so) the overall rural rate of 26.1. The lowest rural MVA death rates are dispersed throughout the state.

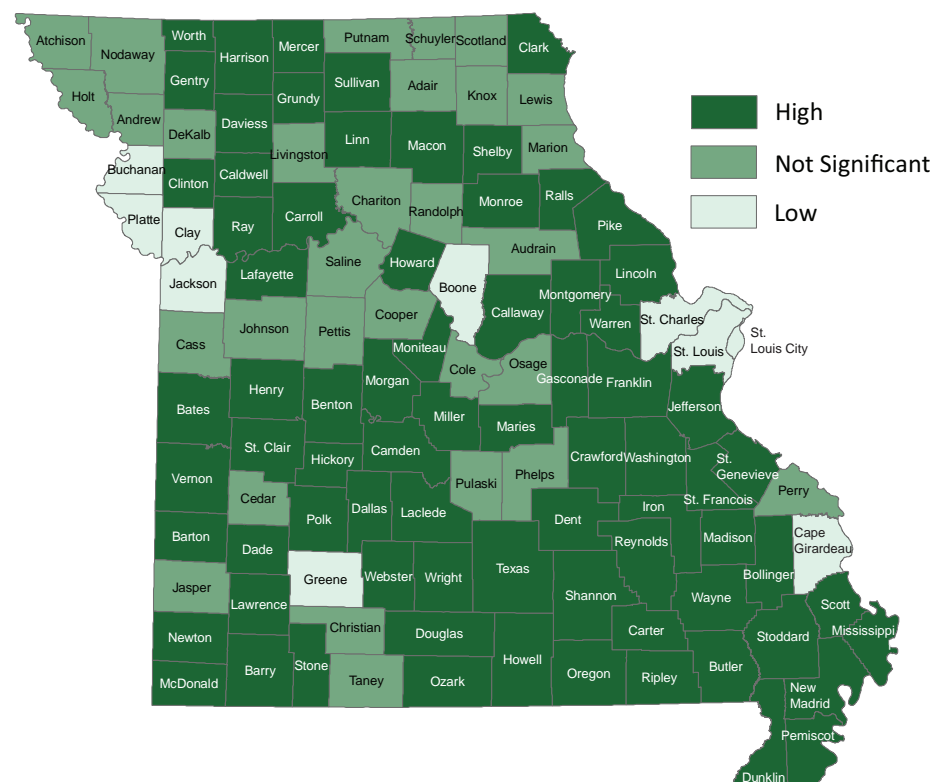
Selected Rural and Urban Counties' MVA Death Rates, Missouri, 2001-2011

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------------|--------|------|-------------|--------|------|
| Highest | Reynolds | 42 | 60.3 | Newton | 158 | 26.1 |
| | Carter | 37 | 59.1 | Jefferson | 469 | 20.9 |
| | Shannon | 44 | 50.2 | Jasper | 246 | 19.9 |
| Lowest | Cape Girardeau | 97 | 11.5 | St Louis | 1,010 | 9.1 |
| | DeKalb | 21 | 14.5 | St. Charles | 348 | 9.7 |
| | Adair | 41 | 14.7 | Platte | 109 | 12.2 |

Age-Adjusted Rates per 100,000 Residents

Male MVA and other unintentional death rates are double female rates in both rural and urban counties.

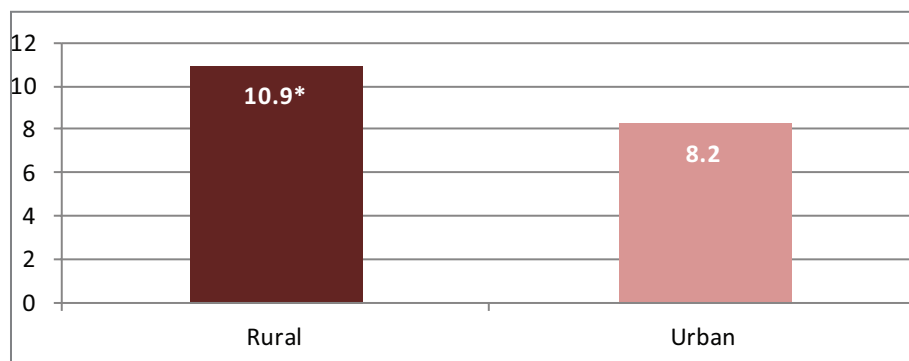
Deaths from Motor Vehicle Accidents Missouri, 2001-2011



Based on Age-Adjusted Rates per 100,000 Residents

The remainder of this section focuses only on motor vehicle traffic accidents (those that occur on roadways), since they are responsible for the majority of MVA hospitalizations. The rural hospitalization rate of 10.9 per 10,000 residents is significantly higher than the urban hospitalization rate of 8.2.

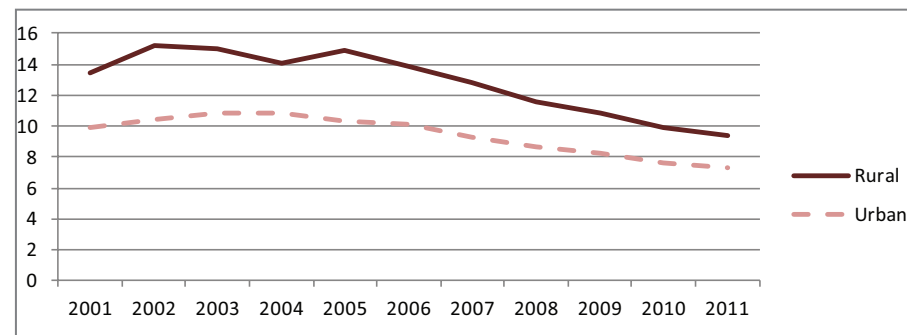
Hospitalization Rates for Motor Vehicle Traffic Accidents Missouri, 2007-2011



Age-Adjusted Rates per 10,000 Residents

Hospitalization rates for motor vehicle traffic accidents decreased for both rural and urban Missourians between 2001 and 2011. The 2011 rate of 9.4 for rural counties is 29.9 percent less than the 2001 rate of 13.4. Urban counties experienced a similar decline over the same time period (from 9.9 to 7.3). Both of these declines are statistically significant.

Hospitalization Rates for Motor Vehicle Traffic Accidents Missouri, 2001-2011



Age-Adjusted Rates per 10,000 Residents

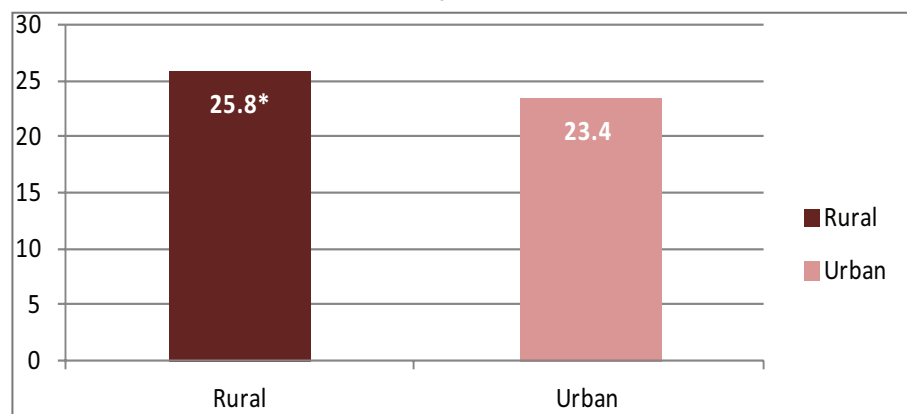
Hospitalization rates for motor vehicle traffic accidents decreased for both rural and urban Missourians between 2001 and 2011.



Alzheimer's Disease

“Alzheimer's Disease (AD) is a progressive brain disorder that damages and eventually destroys brain cells, leading to memory loss and changes in thinking and other brain functions.”^{24,25} The rural AD death rate of 25.8 per 100,000 residents is 10.3 percent higher than the urban rate of 23.4, which is a statistically significant difference.

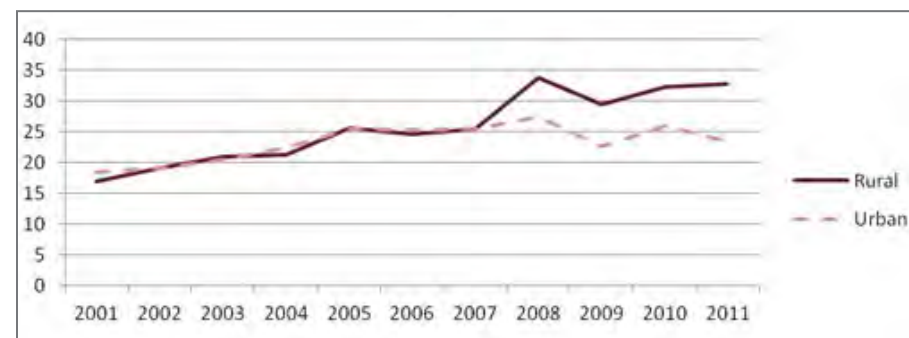
**Death Rates from Alzheimer's Disease
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

Although the rural and urban death rates from AD were similar from 2001 through 2007, rural rates began increasing faster than urban rates between 2007 and 2008. Since 2007, rural AD death rates increased by 28.6 percent, while urban death rates declined slightly.

**Death Rates from Alzheimer's Disease
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

²⁴Alzheimer's Association. (2013). *What we know today about Alzheimer's disease and dementia*. Accessed 2013, August 20, from https://www.alz.org/research/science/alzheimers_research.asp.

²⁵Mayeux, R., & Stern, Y. (2012, August). Epidemiology of Alzheimer disease. *Cold Spring Harbor Perspectives in Medicine*. 2(8), 1-18. Accessed 2013, August 20, from <http://perspectivesinmedicine.cshlp.org/content/2/8/a006239.full.pdf+html>.

The three rural counties with the highest AD death rates are found in the Southeast, Northeast, and Southwest BRFSS Regions. The counties with the lowest rates are not displayed because the rates are based on small numbers of deaths and are considered to be unstable.²⁶

Selected Rural and Urban Counties' Alzheimer's Disease Death Rates Missouri, 2001-2011

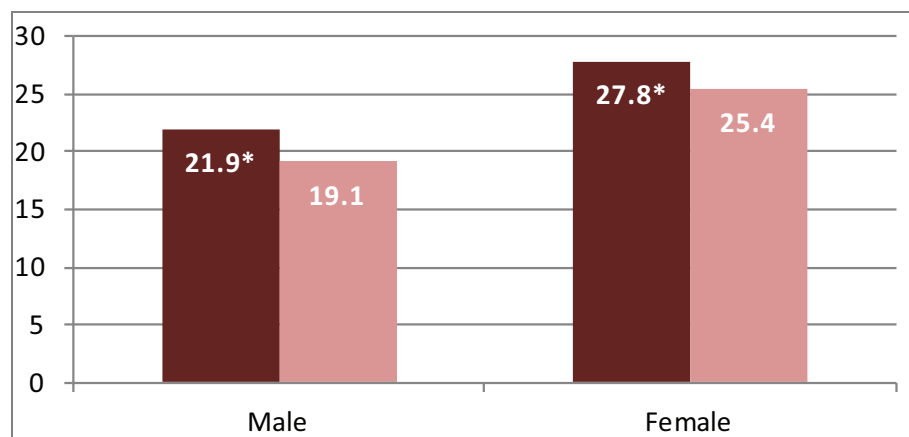
| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------|--------|------|--------|--------|------|
| Highest | Iron | 98 | 62.2 | Platte | 283 | 37.3 |
| | Putnam | 53 | 53.8 | Boone | 446 | 34.1 |
| | McDonald | 96 | 49.4 | Greene | 1,137 | 33.0 |
| | | | | | | |

Age-Adjusted Rates per 100,000 Residents
Lowest rates not shown due to small numbers

Female death rates from AD are significantly higher than male death rates in both rural and urban areas. The rural female death rate is significantly higher than the rates for both rural and urban males as well as urban females.

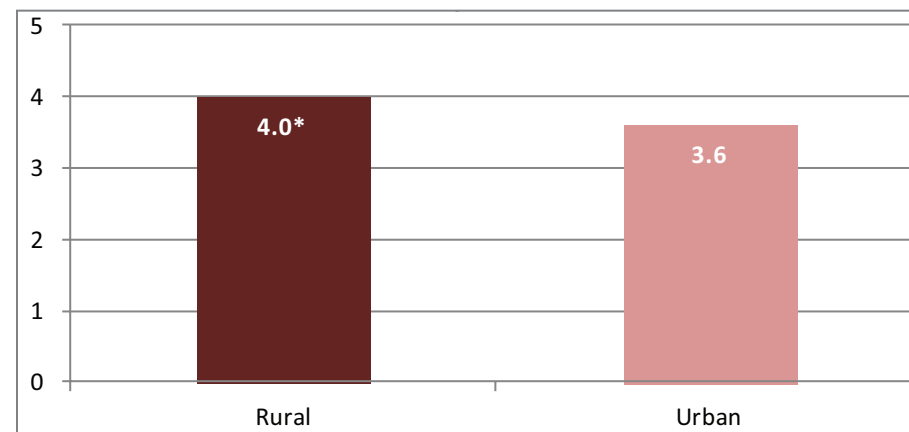
For the 2007-2011 time period, the rural rate of hospitalization for AD is 4.0 per 10,000 residents, significantly higher than the urban rate of 3.6. This 11.1 percent difference in AD hospitalization rates is just slightly higher than the 10.3 percent difference in AD death rates.

Death Rates from Alzheimer's Disease Missouri, 2001-2011



Age-Adjusted Rates per 100,000 Residents

Hospitalization Rates for Alzheimer's Disease Missouri, 2007-2011



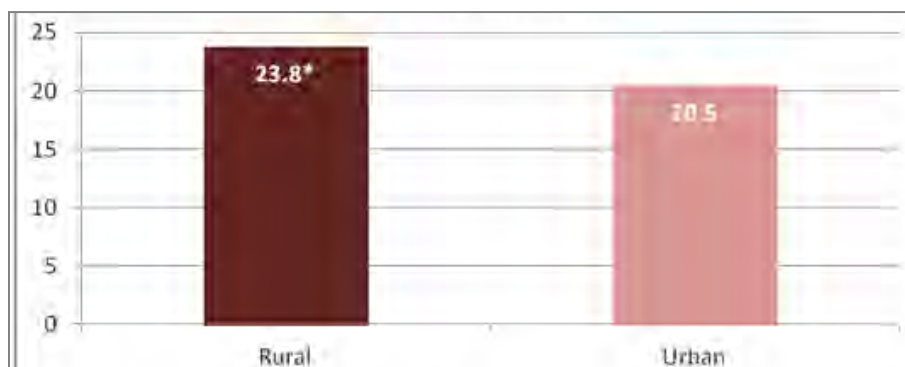
Age-Adjusted Rates per 10,000 Residents

²⁶See the Glossary for a discussion of Unstable Rates.

Pneumonia and Influenza

Rural residents die of pneumonia and influenza at a higher rate than urban residents (23.8 per 100,000 rural residents versus 20.5 urban for 2001-2011). This is a statistically significant difference. Rural residents may not be as likely to receive the recommended vaccinations that prevent these infectious diseases due to limited access to health care services and a lack of non-traditional vaccine administration sites.²⁷

Death Rates from Pneumonia/Influenza Missouri, 2001-2011

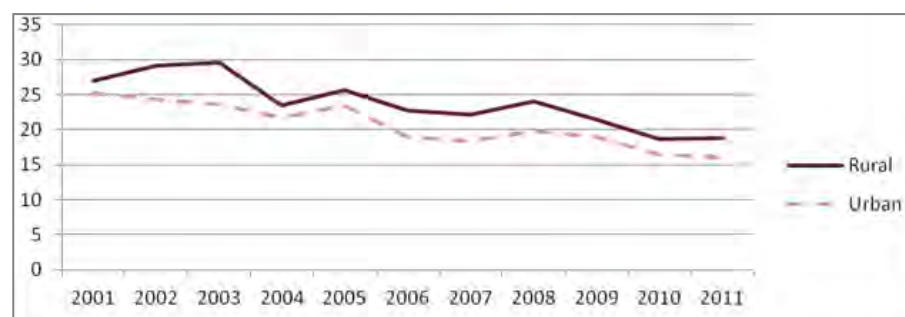


Age-Adjusted Rates per 100,000 Residents



Between 2001 and 2011, pneumonia and influenza death rates steadily declined, by 30.4 percent among rural Missourians and 36.1 percent among urban Missourians. This decrease is statistically significant for both rural and urban residents.

Death Rates from Pneumonia/Influenza Missouri, 2001-2011



Age-Adjusted Rates per 100,000 Residents

²⁷Bennett, K.J., Pumkam, C., & Probst, J.C. (2011, August 11). Rural-urban differences in the location of influenza vaccine administration. *Vaccine* 29(35), 5970-5977. Accessed 2013, August 20, from <http://www.sciencedirect.com/science/article/pii/S0264410X11009029>. doi: 10.1016/j.vaccine.2011.06.038

The three rural counties with the highest pneumonia and influenza death rates are found in the Southeast, Northeast, and Central BRFSS Regions. The three lowest rural rates are likewise found in three different BRFSS Regions (Southwest, Central, and Northwest).

Selected Rural and Urban Counties Pneumonia/Influenza Death Rates, Missouri, 2001-2011

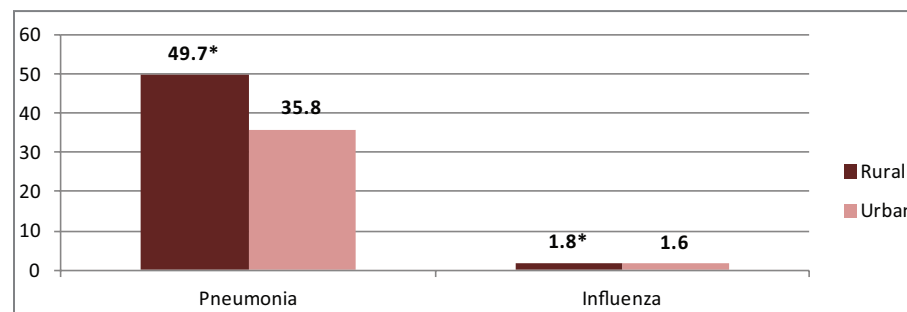
| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------|--------|------|----------------|--------|------|
| Highest | Ripley | 91 | 48.8 | Jasper | 476 | 35.6 |
| | Schuyler | 37 | 47.5 | Newton | 220 | 32.1 |
| | Crawford | 136 | 42.2 | St. Louis City | 946 | 25.4 |
| Lowest | Stone | 49 | 10.4 | Platte | 102 | 12.7 |
| | Camden | 61 | 11.1 | Buchanan | 167 | 13.8 |
| | Andrew | 31 | 12.3 | Clay | 304 | 15.5 |

Age-Adjusted Rates per 100,000 Residents



Rural Missourians are also hospitalized at significantly higher rates than urban Missourians for both pneumonia and influenza (49.7 per 10,000 residents versus 35.8 for pneumonia and 1.8 versus 1.6 for influenza).

Hospitalization Rates for Pneumonia and Influenza Missouri, 2007-2011

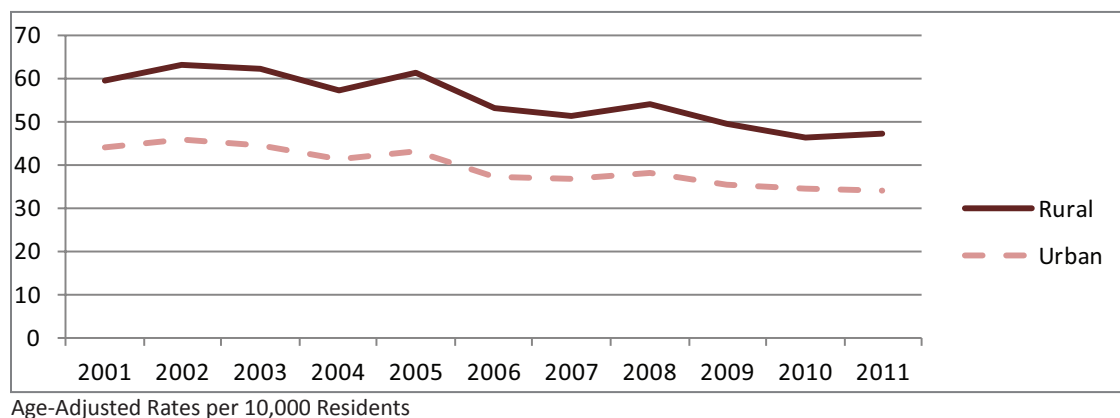


Age-Adjusted Rates per 10,000 Residents

Influenza hospitalization rates tend to fluctuate due to the different types of influenza that are present from year to year. Pneumonia hospitalization rates, however, have a more stable trend. Pneumonia rates significantly decreased from 2001 through 2011 for both rural and urban areas, but the gap between the rural and urban rates remained relatively stable over this time period.

Male residents experience significantly higher pneumonia hospitalization rates than females in both rural and urban areas and also have significantly higher death rates from pneumonia and influenza. The greatest rural-urban disparity in terms of pneumonia hospitalizations by age group appears in the Under 15 population, for which the rural rate (33.9) is 62.2 percent higher than the urban rate (20.9).

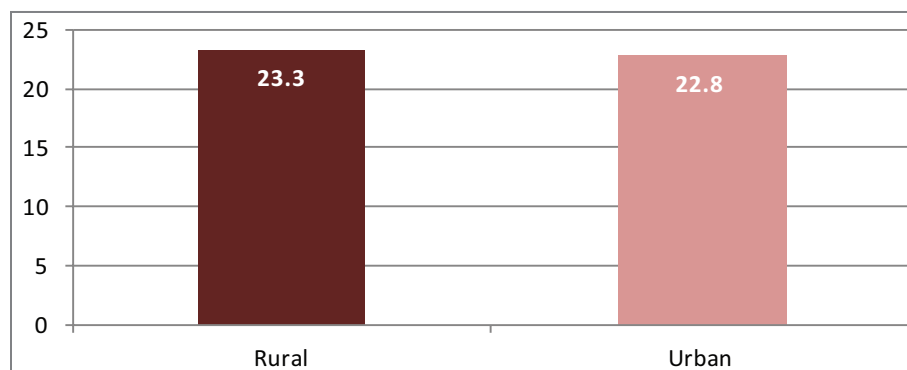
Hospitalization Rates for Pneumonia Missouri, 2001-2011



Diabetes

The 2011 Missouri County-Level Study found that 9.8 percent of Missouri adults have diabetes.²⁸ Diabetes “occurs when the body cannot produce or respond appropriately to insulin.”²⁹ According to the CDC, “diabetes is the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness among adults in the United States. It is also a major cause of heart disease and stroke.”³⁰

**Death Rates from Diabetes
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents



Research has found that rural diabetics are less likely to receive certain types of care, such as eye and foot examinations and diabetes education.³¹ This lack of preventive care may be leading to higher death rates among rural Missourians. For the 2001-2011 time period, the rural county diabetes death rate of 23.3 per 100,000 residents is slightly higher than the urban rate of 22.8, although the difference between the two rates is not statistically significant.

²⁸Age-adjusted prevalence

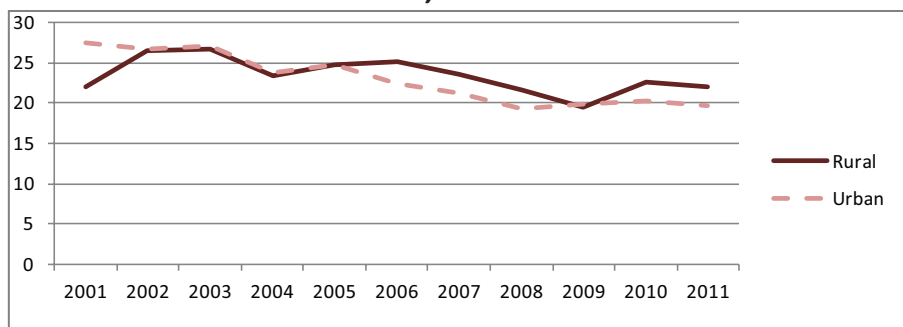
²⁹HealthyPeople.gov. (Last updated 2013, April 10). Diabetes. Accessed 2013, August 16, from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=8>.

³⁰U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2011). National diabetes fact sheet: *National estimates and general information on diabetes and prediabetes in the United States*. Accessed 2013, August 16, from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf.

³¹Krishna, S., Gillespie, K. N., & McBride, T. M. (2010). Diabetes burden and access to preventive care in the rural United States. *Journal of Rural Health*. 26(1), 3-11. Accessed 2013, August 16, from <http://onlinelibrary.wiley.com/doi/10.1111/j.1748-0361.2009.00259.x/abstract;jsessionid=D99AD3AB6618092D6190FE85B5D63290.d03r04>. doi: 10.1111/j.1748-0361.2009.00259.x

Annual diabetes death rates for urban residents gradually declined from 2001 through 2011. As a result, the 2011 urban rate is statistically significantly lower than the 2001 rate. The rural diabetes death rate, however, fluctuated throughout the same time period, with no significant change from year to year.

**Death Rates from Diabetes
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

Rural hospitalization rates for diabetes are significantly lower than urban rates while the rural death rate is higher.

The rural county with the highest diabetes death rate is located in the Northeast BRFSS Region. The counties with the lowest rates are not displayed because the rates are based on small numbers of deaths and are considered to be unstable.³²

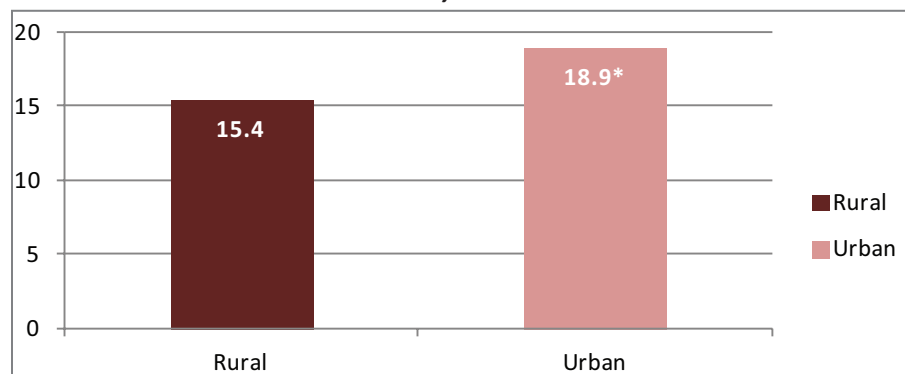
**Selected Rural and Urban Counties' Diabetes Death Rates
Missouri, 2001-2011**

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|--------------|--------|------|----------------|--------|------|
| Highest | Lewis | 74 | 48.8 | Buchanan | 483 | 43.2 |
| | Iron | 68 | 45.3 | St. Louis City | 1,281 | 36.2 |
| | St. Francois | 340 | 44.3 | Jefferson | 521 | 26.9 |
| | | | | | | |

Age-Adjusted Rates per 100,000 Residents
Lowest rates not shown due to small numbers

In spite of their higher diabetes death rate, rural Missourians are hospitalized for diabetes at a rate of only 15.4 hospitalizations per 10,000 residents, which is 18.5 percent lower than the urban rate of 18.9 and is a statistically significant difference. This difference remained relatively stable from 2001 to 2011, even as diabetes hospitalization rates significantly increased for both rural and urban residents.

**Hospitalization Rates for Diabetes
Missouri, 2007-2011**



Age-Adjusted Rates per 10,000 Residents

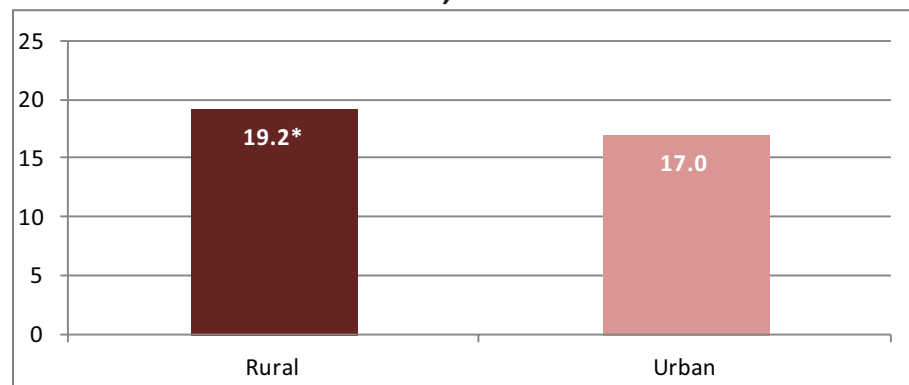
³²See the Glossary for a discussion of Unstable Rates.

Kidney Disease

Kidney diseases such as nephritis, nephrosis, and nephrotic syndrome damage the kidneys and leave them unable to filter waste from the bloodstream.^{33,34} The rural kidney disease death rate of 19.2 per 100,000 residents exceeds the urban rate of 17.0 by 12.9 percent for the overall 2001-2011 time period. This difference is statistically significant.

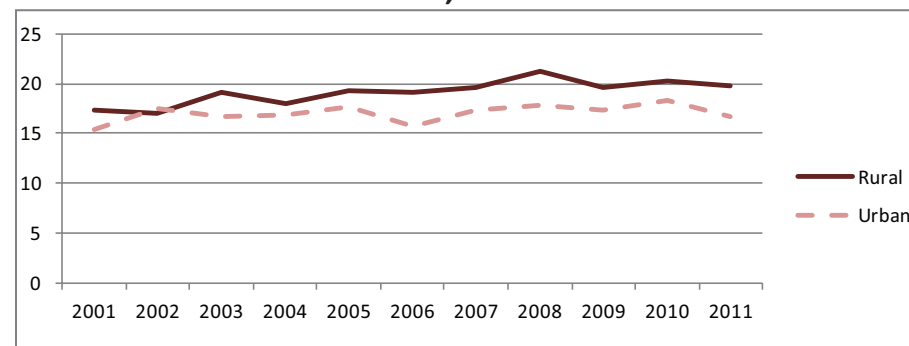
Over the past 11 years, the kidney disease death rate in rural Missouri increased by 13.8 percent, from 17.4 in 2001 to 19.8 in 2011. At the same time, the urban rate also increased, but only by 8.4 percent. The increases for both groups may be due to the rising prevalence of chronic kidney disease and associated risk factors such as obesity, diabetes, hypertension, and the aging of the population.³⁵

**Death Rates from Kidney Disease
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

**Death Rates from Kidney Disease
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

³³U.S. National Library of Medicine. (Last updated 2013, September 7). Kidney diseases. *Medline Plus*. Accessed 2013, September 11 from <http://www.nlm.nih.gov/medlineplus/kidneydiseases.html>.

³⁴Missouri Department of Health and Senior Services. *Leading causes of death profile – Definitions*. Accessed 2013, September 9, from http://health.mo.gov/data/mica/CDP_MICA/CofDDefinitionofIndicators.html#I1.

³⁵Coresh, J., Selvin, E., Stevens, L.A., Manzi, J., Kusek, J.W., Eggers, P., . . . Levey, A.S. Prevalence of chronic kidney disease in the United States. *Journal of the American Medical Association* 298(17), 2038-2047. Accessed 2013, August 20, from <http://jama.jamanetwork.com/article.aspx?articleid=209357>. doi:10.1001/jama.298.17.2038

The rural counties with the two highest kidney disease death rates are located in the Northeast BRFSS Region. The counties with the lowest rates are not displayed because the rates are based on small numbers of deaths and are considered to be unstable.³⁶

Selected Rural and Urban Counties' Kidney Disease Death Rates, Missouri, 2001-2011

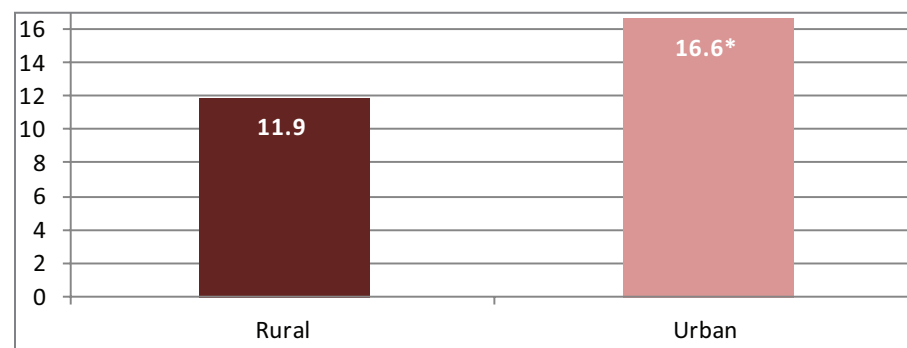
| | Rural | Number | Rate | Urban | Number | Rate |
|---------|--------|--------|------|----------------|--------|------|
| Highest | Adair | 102 | 35.0 | Cass | 290 | 27.7 |
| | Linn | 85 | 34.8 | Jackson | 1,684 | 22.6 |
| | DeKalb | 57 | 34.1 | St. Louis City | 774 | 21.4 |
| | | | | | | |

Age-Adjusted Rates per 100,000 Residents
Lowest rates not shown due to small numbers



Kidney disease hospitalization rates are significantly lower in rural areas compared to urban areas. The 2007-2011 rural rate of 11.9 per 10,000 residents is 28.3 percent lower than the urban rate of 16.6. Male hospitalization rates are significantly higher than female rates in both rural and urban areas.

Hospitalization Rates for Kidney Disease Missouri, 2007-2011



Age-Adjusted Rates per 10,000 Residents

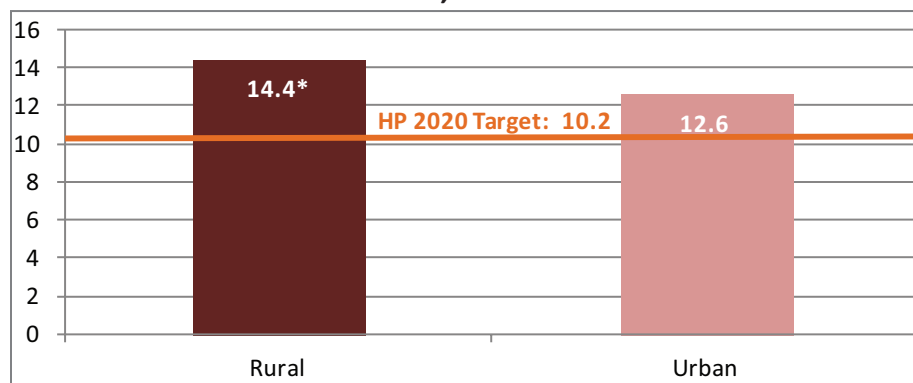
Kidney disease hospitalization rates
are significantly lower in rural areas
compared to urban areas.

³⁶See the Glossary for a discussion of Unstable Rates.

Suicide

During the time period from 2001 through 2011, 8,587 Missouri residents committed suicide. The rural suicide rate of 14.4 per 100,000 residents is 14.3 percent higher than the urban rate of 12.6. This difference is statistically significant. Both rates exceed the Healthy People 2020 target of 10.2.

**Death Rates from Suicide
Missouri, 2001-2011**



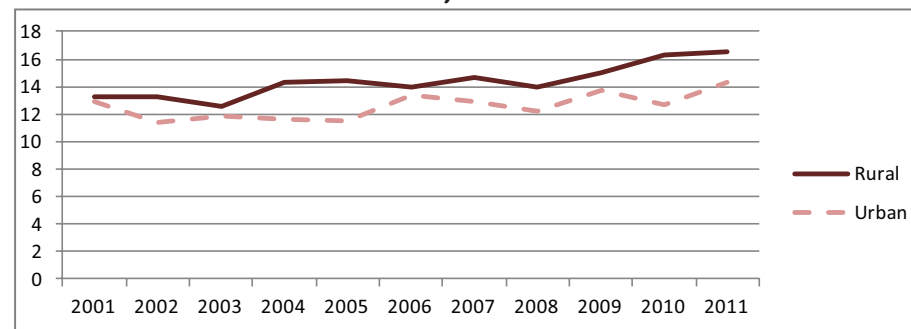
Age-Adjusted Rates per 100,000 Residents

From 2000-2011, the suicide rate in rural areas increased by 25 percent, while the urban rate increased by 10 percent.



The suicide rates in both rural and urban areas increased during this time period. Rural rates were consistently higher than urban rates from 2001 through 2011. The rural rate increased by 25.0 percent during this time, while the urban rate increased by only 10.9 percent.

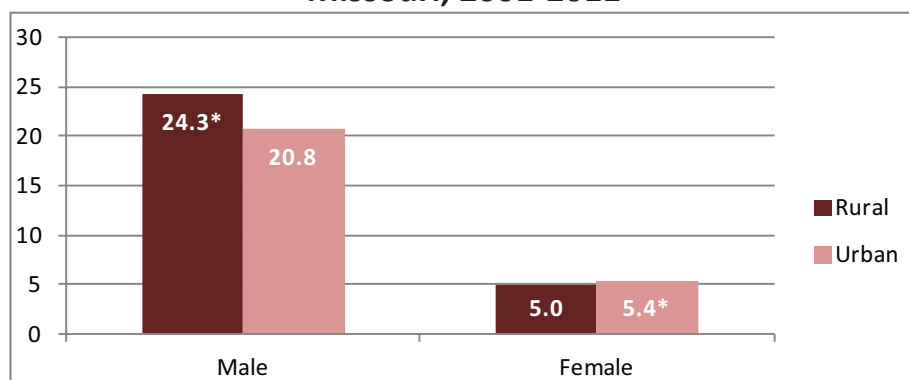
**Death Rates from Suicide
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Residents

Male suicide rates are significantly higher than female rates in both rural and urban areas of Missouri. Rural males have a significantly higher death rate than urban males, but the reverse is true among females, with urban females having a significantly higher rate than their rural counterparts.

Death Rates from Suicide Missouri, 2001-2011



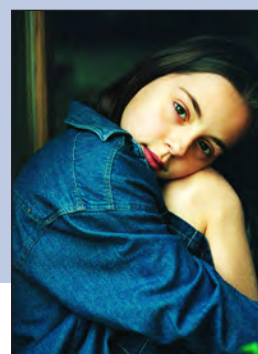
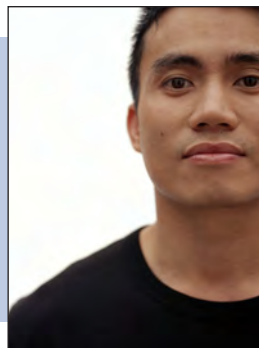
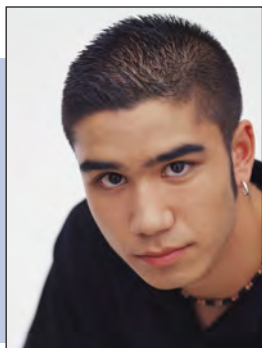
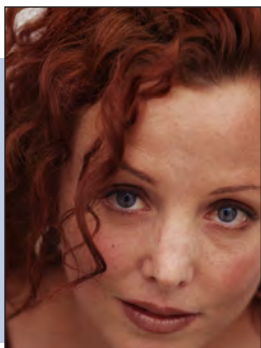
Age-Adjusted Rates per 100,000 Residents

While the urban suicide rate is highest among residents ages 45 to 64, the rural suicide rate is highest among residents ages 25 to 44. In fact, 25 to 44 is the only age group for which the rural rate is significantly higher than the urban rate.

Death Rates from Suicide Missouri, 2001-2011

| Age | Rural | Urban |
|-------------|-------|-------|
| Under 15 | 0.6 | 0.6 |
| 15 to 24 | 12.1 | 11.4 |
| 25 to 44 | 20.4 | 16.6 |
| 45 to 64 | 18.9 | 18.1 |
| 65 and Over | 17.1 | 14.7 |

Age-Adjusted Rates per 100,000 Residents

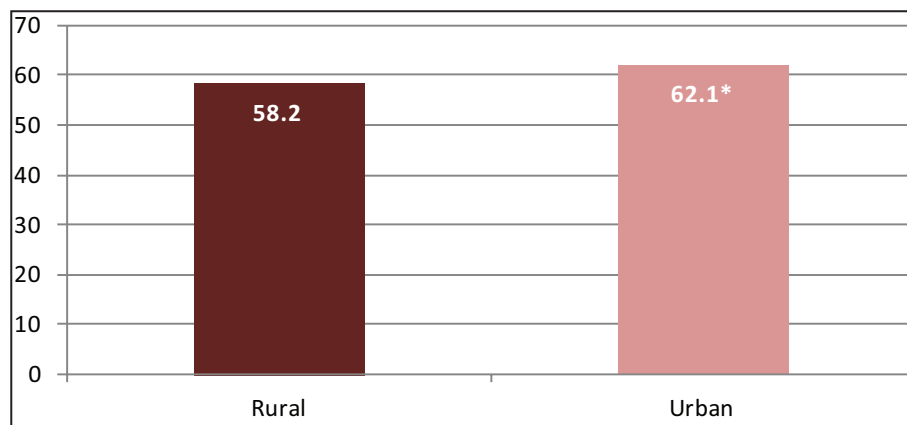


Other Leading Causes of Hospitalization

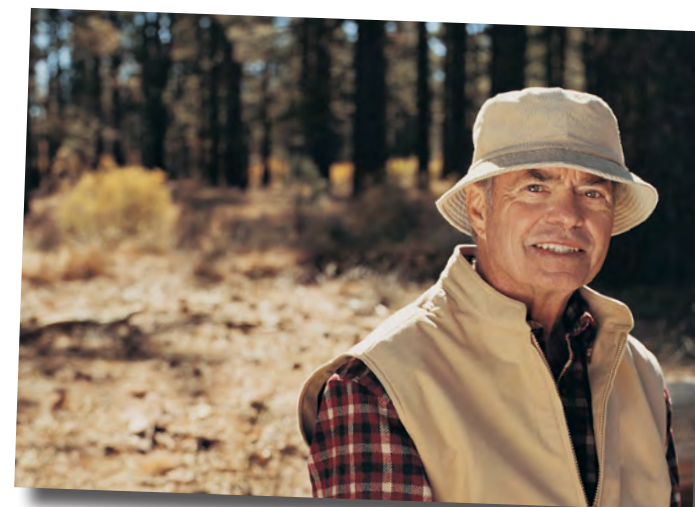
Affective Disorders

Affective, or mood, disorders include a variety of diseases, such as depression and bipolar and anxiety disorders.³⁷ The rural Missouri hospitalization rate for affective disorders is 6.3 percent lower than the rate for urban Missourians (58.2 per 10,000 rural residents versus 62.1 for urban). This difference is statistically significant.

**Hospitalization Rates for Affective Disorders
Missouri, 2007-2011**

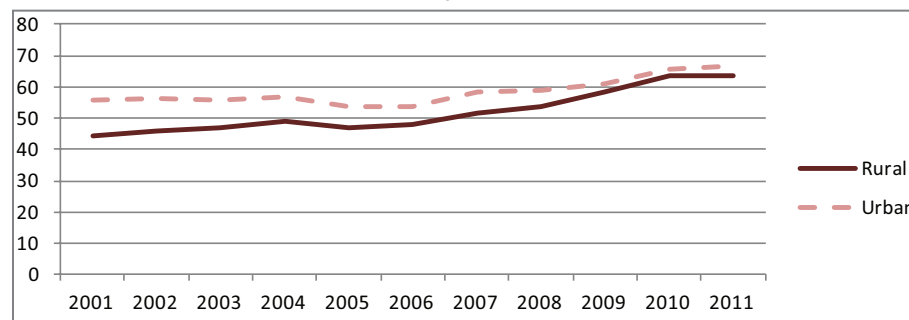


Age-Adjusted Rates per 10,000 Residents



Affective disorder hospitalization rates increased over the past few years for both rural and urban residents. The rates for both geographies stayed relatively stable between 2001 and 2006. However, from 2006 through 2011, the rural rate increased by 32.2 percent and the urban rate increased by 23.9 percent. The result of these increases is that rural and urban rates are much more similar in 2011 (with a 5.0 percent rate difference) than they were in 2001 (when a 25.1 percent rate difference existed).

**Hospitalization Rates for Affective Disorders
Missouri, 2001-2011**



Age-Adjusted Rates per 10,000 Residents

³⁷Ellis, ME. (Last reviewed 2013, May 30). Affective disorders overview. *Healthline*. Accessed 2013, September 10, from <http://www.healthline.com/health/affective-disorders>.

The rural counties with the highest hospitalization rates for affective disorders are located in the Southeast BRFSS Region. The lowest rates are found in counties in the Northeast and Northwest BRFSS Regions.

**Selected Rural and Urban Counties'
Affective Disorders Hospitalization Rates
Missouri, 2007-2011**

| | Rural | Number | Rate | Urban | Number | Rate |
|---------|----------|--------|-------|-----------|--------|------|
| Highest | Pemiscot | 1,233 | 142.4 | Buchanan | 3,511 | 81.3 |
| | Dunklin | 1,994 | 130.8 | Jackson | 24,390 | 74.8 |
| | Butler | 2,143 | 109.7 | Jefferson | 7,807 | 73.0 |
| Lowest | Clark | 55 | 17.0 | Newton | 827 | 29.7 |
| | Scotland | 50 | 22.3 | Boone | 2,523 | 31.3 |
| | DeKalb | 144 | 22.9 | Platte | 2,122 | 49.7 |

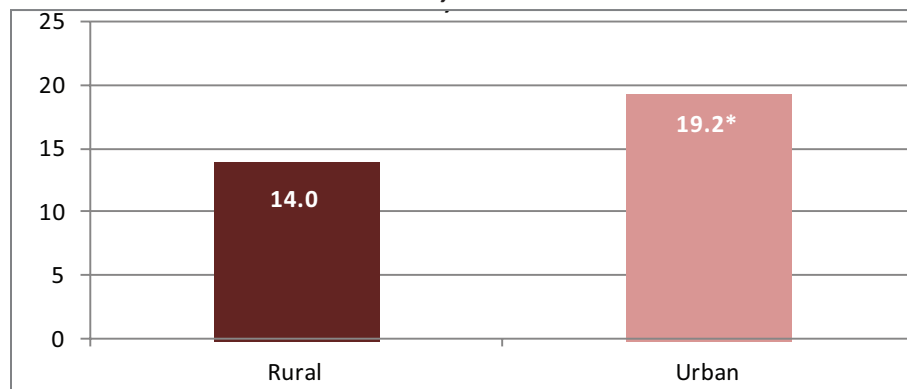
Age-Adjusted Rates per 10,000 Residents



Alcohol- and Substance-Related Mental Disorders

The rural inpatient hospitalization rate of 14.0 per 10,000 residents for alcohol- and substance-related mental disorders is 27.1 percent lower than the urban rate of 19.2, a statistically significant difference. For both rural and urban areas, slightly more hospitalizations are alcohol-related versus substance-related (55.7 percent for rural residents versus 58.7 percent for urban residents).

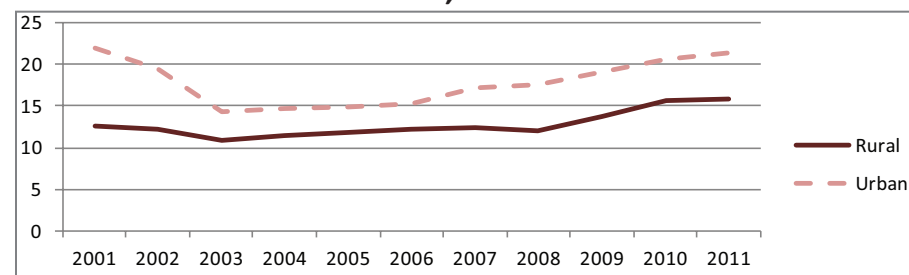
**Hospitalization Rates for
for Alcohol/Substance-Related Mental Disorders
Missouri, 2007-2011**



Age-Adjusted Rates per 10,000 Residents

While the rates for both urban and rural residents fluctuated greatly over the last decade, rural rates were consistently lower than urban rates.

**Hospitalization Rates for
for Alcohol/Substance-Related Mental Disorders
Missouri, 2001-2011**



Age-Adjusted Rates per 10,000 Residents

The rural counties with the two highest alcohol- and substance-related mental disorders hospitalization rates are located in the Southeast BRFSS Region.

**Selected Rural and Urban Counties'
Alcohol- and Substance-Related Mental Disorders
Hospitalization Rates
Missouri, 2007-2011**

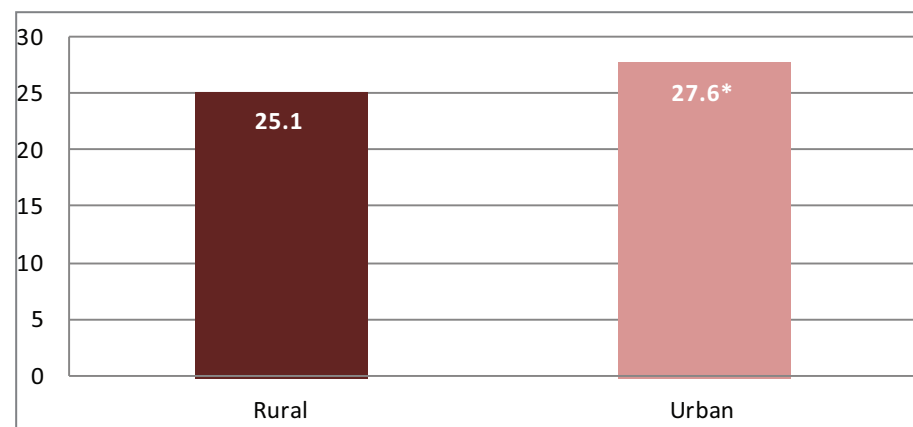
| | Rural | Number | Rate | Urban | Number | Rate |
|---------|-----------|--------|------|-----------|--------|------|
| Highest | Dunklin | 543 | 37.2 | Jasper | 3,211 | 59.1 |
| | Pemiscot | 244 | 29.3 | Buchanan | 1,449 | 33.6 |
| | Taney | 625 | 26.0 | Greene | 4,320 | 32.8 |
| Lowest | DeKalb | 24 | 3.3 | Cass | 502 | 10.2 |
| | Bollinger | 25 | 4.3 | Jefferson | 1,196 | 11.1 |
| | Lewis | 23 | 4.4 | Platte | 525 | 11.7 |

Age-Adjusted Rates per 10,000 Residents

Septicemia

Septicemia, also referred to as blood poisoning or bacteremia with sepsis, occurs when bacteria get into the bloodstream, often from an infection in some other part of the body.³⁸ Septicemia hospitalization rates are significantly higher for urban residents than for their rural counterparts (27.6 per 10,000 for urban residents versus 25.1 for rural).

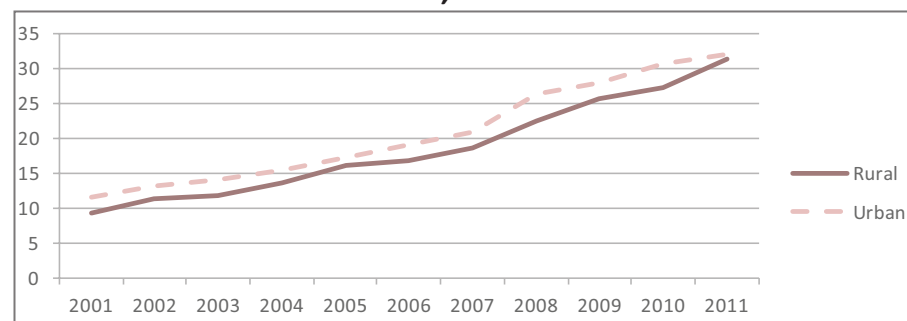
**Hospitalization Rates for Septicemia
Missouri, 2007-2011**



Age-Adjusted Rates per 10,000 Residents

Septicemia hospitalization rates spiked during the last decade for both rural and urban Missourians. The rural rate more than doubled (a 233.0 percent increase) between 2001 and 2011, from 9.4 to 31.3. The urban rate increase was nearly as large, jumping from 11.5 to 32.1 (a 179.1 percent increase).

**Hospitalization Rates for Septicemia
Missouri, 2001-2011**



Age-Adjusted Rates per 10,000 Residents

The three highest septicemia hospitalization rates are found in adjacent counties in the Northeast BRFSS Region. The counties with the lowest rates are not displayed because the rates are based on small numbers of deaths and are considered to be unstable.³⁹

**Selected Rural and Urban Counties'
Septicemia Hospitalization Rates,
Missouri, 2007-2011**

| | | | | | | |
|---------|----------|-------|------|-------------|-------|------|
| Highest | Adair | 1,102 | 90.0 | Jasper | 3,174 | 51.9 |
| | Schuyler | 255 | 80.6 | St. Charles | 5,543 | 33.8 |
| | Knox | 174 | 62.0 | Newton | 1,043 | 32.0 |

Age-Adjusted Rates per 10,000 Residents

³⁸U.S. National Library of Medicine. (Last updated 2013, March 22). Septicemia. *MedlinePlus*. Accessed 2013, September 10, from <http://www.nlm.nih.gov/medlineplus/ency/article/001355.htm>.

³⁹See the Glossary for a discussion of Unstable Rates

Maternal, Infant, and Child Health

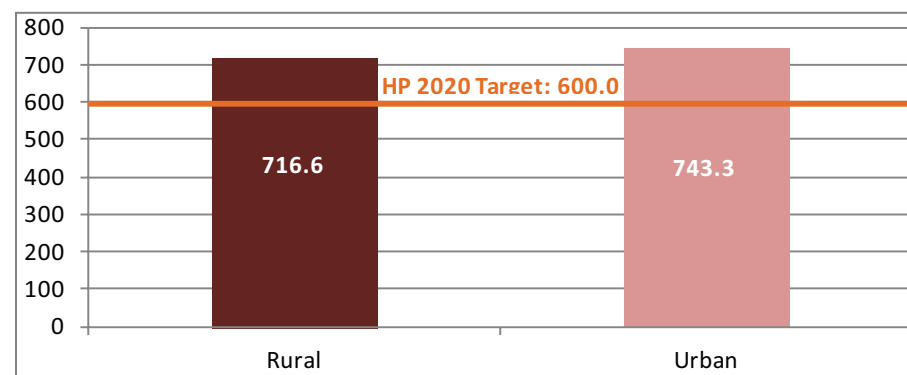
Maternal, infant, and child health indicators⁴⁰ are important measures of the health status of a community. The health of mothers, infants, and children is important because “their well-being determines the health of the next generation and can help predict future public health challenges for families, communities, and the health care system.”⁴¹



Infant Deaths

In Missouri, the rural infant death rate of 716.6 per 100,000 live births for 2001-2011 is actually lower than the urban rate of 743.3, although the difference is not statistically significant. However, both of these rates are higher than the Healthy People 2020 U.S. baseline rate of 670.0 and the target rate of 600.0.⁴²

**Infant Death Rates from All Causes
Missouri, 2001-2011**



Age-Adjusted Rates per 100,000 Live Births

⁴⁰The data in this chapter were collected from the Missouri Information for Community Assessment (MICA) system unless otherwise specified. Infant death data were collected from the Death MICA. All other data were collected from the Birth MICA. See Appendix A for more information on the MICA system.

⁴¹HealthyPeople.gov. (Last updated 2013, April 10). Maternal, infant, and child health. Accessed 2013, August 15, from <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicId=26>.

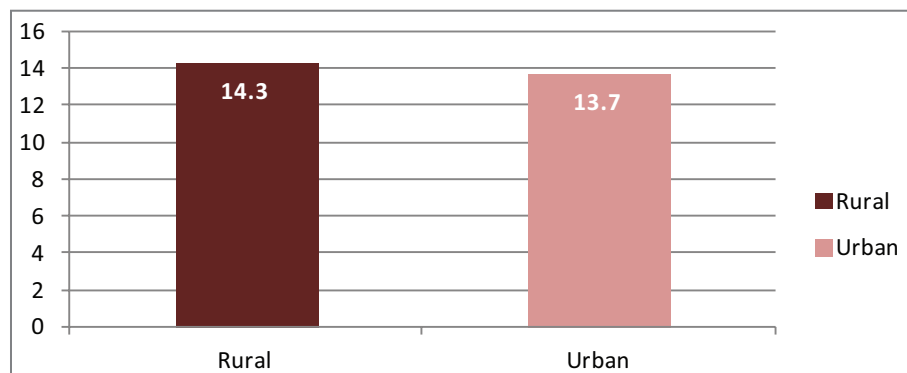
⁴²In specific years, the Missouri rural and urban infant death rates have fallen below the Healthy People 2020 baseline rate provided above. However, in order to provide more stable rates, Missouri typically reports an eleven-year combined death rate. None of the Missouri rates fell below the Healthy People 2020 target rate of 600.0 during the 2001-2011 time period.

Inadequate Prenatal Care

Adequacy of prenatal care measures when a pregnant woman first received prenatal care and how often she received prenatal care throughout her pregnancy.⁴³ “Early prenatal care is especially important...Mothers who do not receive any prenatal care are three times more likely to deliver a low birth weight baby than mothers who received prenatal care, and infant mortality is five times higher.”⁴⁴

In Missouri, there is no significant difference between the rates of 2010 inadequate prenatal care for rural mothers (14.3 percent of live births) versus urban mothers (13.7 percent)⁴⁵. The rates for both rural and urban Missourians are lower than the Healthy People 2020 baseline and target rates of 29.2 percent and 22.1 percent, respectively.

**Inadequate Prenatal Care Rates
Missouri, 2010**



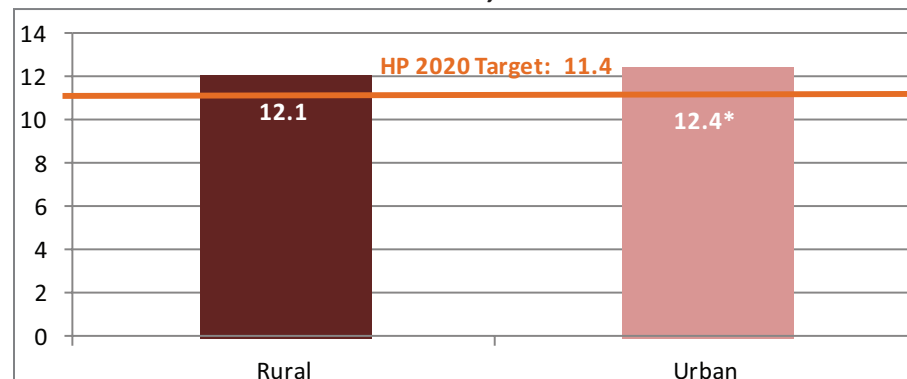
Rates per 100 Live Births

Preterm Births

Preterm births are births that occur before the 37th week of pregnancy. “Preterm-related causes of death together accounted for 35 percent in 2008 of all infant deaths, more than any other single cause. Preterm birth costs the U.S. health care system more than \$26 billion each year.”⁴⁶

In Missouri, the rural preterm birth rate of 12.1 percent of live births is significantly lower than the urban rate of 12.4 percent. The rural rate significantly increased over the past decade, from 11.4 percent in 2000. Both Missouri rates fall below the Healthy People 2020 baseline rate of 12.7 percent but exceed the 2020 target rate of 11.4 percent.

**Inadequate Prenatal Care Rates
Missouri, 2010**



Rates per 100 Live Births

⁴³Kotelchuck, M. (1994, September). *Overview of adequacy of prenatal care utilization index*. Accessed 2013, September 10, from http://www.mchlibrary.info/databases/HSNRCPDFs/Overview_APCUIndex.pdf.

⁴⁴United Health Foundation. Prenatal care. *America's Health Rankings*. Accessed 2013, September 10, <http://www.americashealthrankings.org/All/PrenatalCare/2012>.

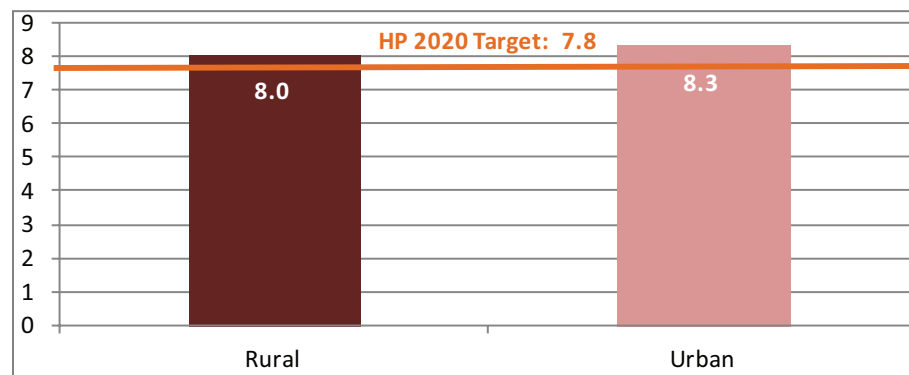
⁴⁵Earlier data are not reported due to changes in the collection of the initial prenatal care date that began with conversion to the electronic birth certificate in 2010. As a result, the 2010 rates are higher than earlier rates. The 2010 rates are considered to be more accurate.

⁴⁶Centers for Disease Control and Prevention. (Last updated 2013, March 21). *Reproductive health – Preterm birth*. Accessed 2013, August 16, from <http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm>.

Low Birth Weight

Low birth weight of less than 2,500 grams (approximately 5 pounds, 8 ounces) can lead to several health problems immediately after birth and later in life.⁴⁷ In Missouri, the low birth weight rate does not significantly differ for rural (8.0 percent of live births) and urban (8.3 percent) mothers. Both the rural and the urban rates exceed the Healthy People 2020 target rate of 7.8 percent.

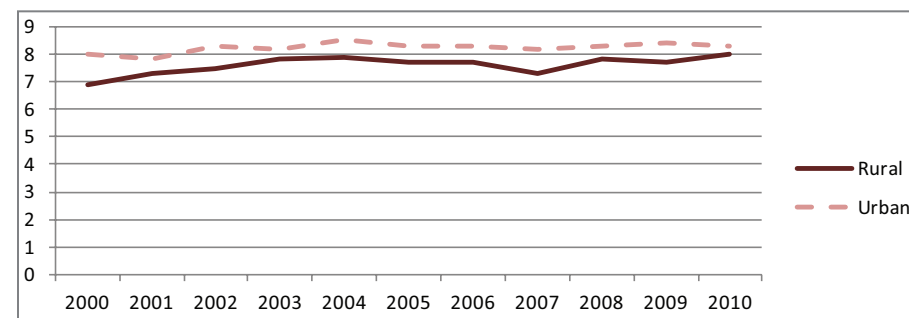
**Low Birth Weight Rates
Missouri, 2010**



Rates per 100 Live Births

However, while the urban rate did not change significantly between 2000 and 2010, the rural rate significantly increased from 6.9 percent to 8.0 percent.

**Low Birth Weight Rates
Missouri, 2000-2010**



Rates per 100 Live Births

⁴⁷March of Dimes. (Last reviewed 2012, September). *Low birthweight*. Accessed 2013, August 16, from <http://www.marchofdimes.com/baby/low-birthweight.aspx>.

Oral Health

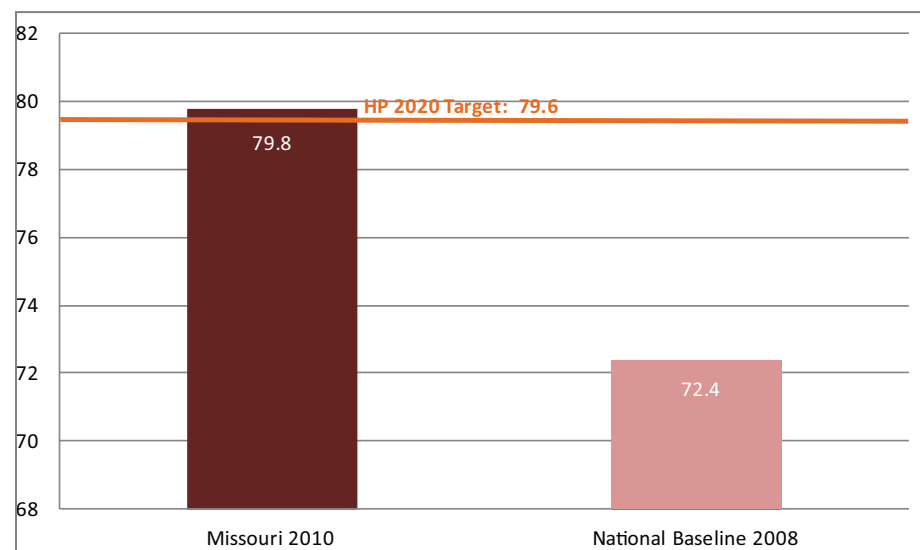
As stated in the seminal 2000 report, *Oral Health in America: A Report of the Surgeon General*, oral health is essential to general health and well-being. The consequences of poor oral health are pain, financial and social costs, and complications that affect overall well-being. Poor oral health has been linked to systematic disease such as diabetes, heart and lung diseases, and strokes. Even though oral health can be achieved by all with basic oral health practices and access to care, not all individuals are achieving the same degree of oral health.



Prevention

The consumption of optimally fluoridated water is a safe and effective way to prevent tooth decay. The CDC recognizes community water fluoridation as one of the greatest public health achievements in history. About 66% of Missourians receive optimally fluoridated water. Unfortunately, about one million Missourians, mainly in rural areas, are not on community water systems and it is unclear whether natural fluoride levels are optimal in the water they receive from private wells.

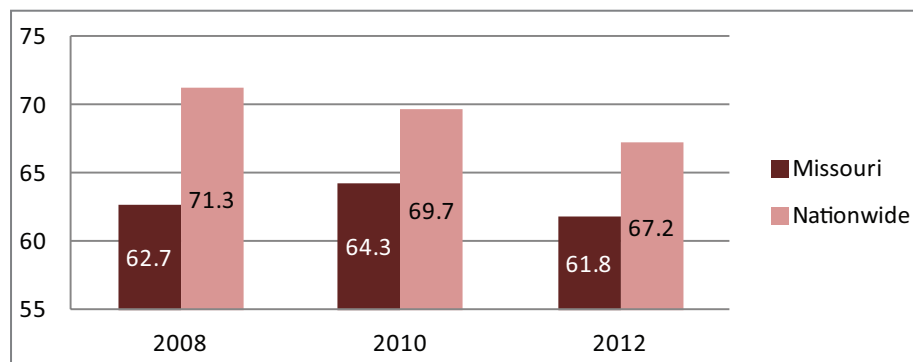
Proportion of Population on Community Water Systems with Optimal Fluoridation



Source: Water Fluoridation Reporting System and Healthy People 2020

The BRFSS survey collects data on oral health questions every other year. Only 61.8% of those surveyed in 2012 reported visiting a dentist or dental clinic in the last year. This is lower than the median rate for all fifty states and the District of Columbia, 67.2%. Missouri's rate has been lower than the national median rate all three years the question was asked.

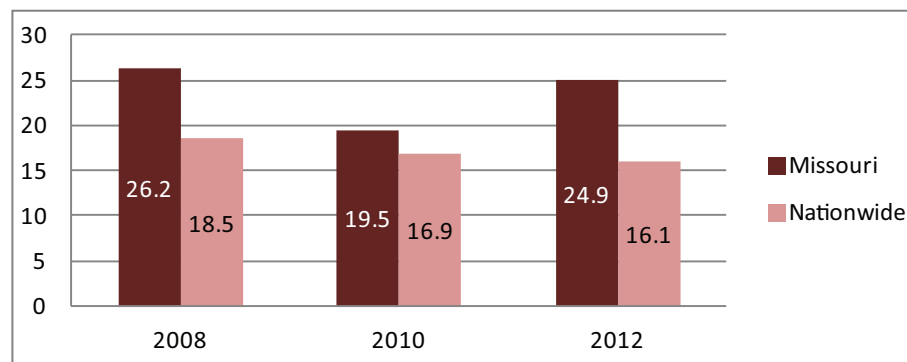
Visited a Dentist in the Last Year for Any Reason Missouri versus National Median, 2008-2012



Estimates per 100 Residents
Source: Behavioral Risk Factor Surveillance System

During the most recent BRFSS survey 24.9% of Missourians 65 years and older reported missing all permanent teeth. This is higher than the national median of 16%. Missouri's rates were higher than the national median in 2008, 2010, and 2012.

Adults 65 and Older - All Teeth Extracted Missouri versus National Median, 2008-2012



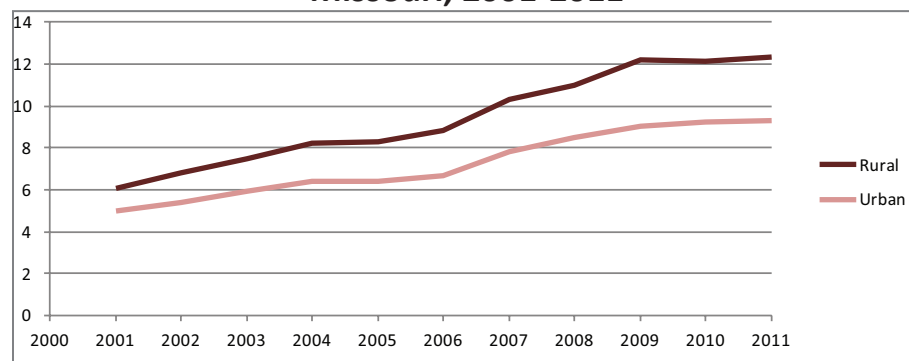
Estimates per 100 Residents
Source: Behavioral Risk Factor Surveillance System



Emergency Department Utilization and Hospitalizations

In 2011, over 58,000 emergency department (ED) visits due to “disorders of the tooth and jaw” were reported in the Missouri Information for Community Assessment (MICA). These visits were reviewed and found to include complaints that could be handled by a dentist, and did not involve injuries or malignancies. Since 2001, there has been a steady increase in ED visit rates for dental complaints among both rural and urban residents in Missouri. However, each year, the rates are statistically significantly higher for rural than urban residents.

**Emergency Department Rates from Dental Complaints
Missouri, 2001-2011**



Age-adjusted rates per 1,000 residents

There were also 550 inpatient hospitalizations in 2011 for disorders of the teeth and jaw in addition to the 58,000 ED visits described previously. These 550 hospitalizations alone led to \$12.2 million dollars in charges. Although these data are based on the expected pay source at discharge rather than the actual amount and entity billed, it is important to note that Medicaid was the expected pay source for \$3 million in charges and commercial insurance was \$4.7 million; “self pay” (a proxy for the uninsured) was \$1.9 million.



HEALTH BEHAVIORS AND RISK FACTORS

Several common risk factors affect many of the health conditions discussed in the Health Status section of this report. As mentioned previously, the Missouri Department of Health and Senior Services, in collaboration with the Missouri Foundation for Health, developed the Missouri County-Level Study⁴⁸ to produce county-specific estimates for many of the risk factors and associated conditions related to chronic diseases.⁴⁹

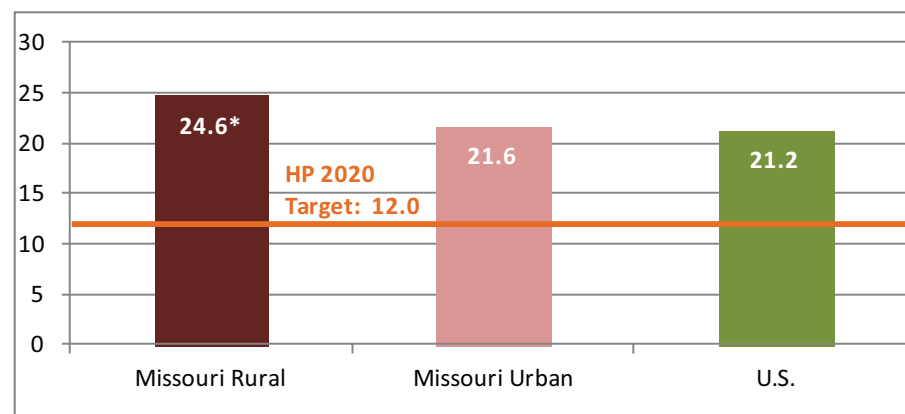


Tobacco Use

According to the CDC, “tobacco use is the single most preventable cause of disease, disability, and death in the United States.”⁵⁰ State and national surveys estimate that the 2011 Missouri adult smoking rate is higher than the U.S. national average (23.0 percent versus 21.2 percent).

While smoking is a statewide problem, it is an even larger problem for Missouri’s rural areas. The 2011 rural current smoking rate of 24.6 percent is statistically significantly higher than the urban rate of 21.6 percent (a percentage difference of almost 14 percent). Even greater disparities exist among smokeless tobacco users, with the rate for rural counties more than double the urban rate (6.6 percent versus 3.1 percent).

**Current Smoking Rates
Missouri and U.S., 2011**



Estimates per 100 Residents

Sources: Missouri County-Level Study, 2011, and U.S. BRFSS, 2011

⁴⁸See the Glossary for a description of the Missouri County-Level Study.

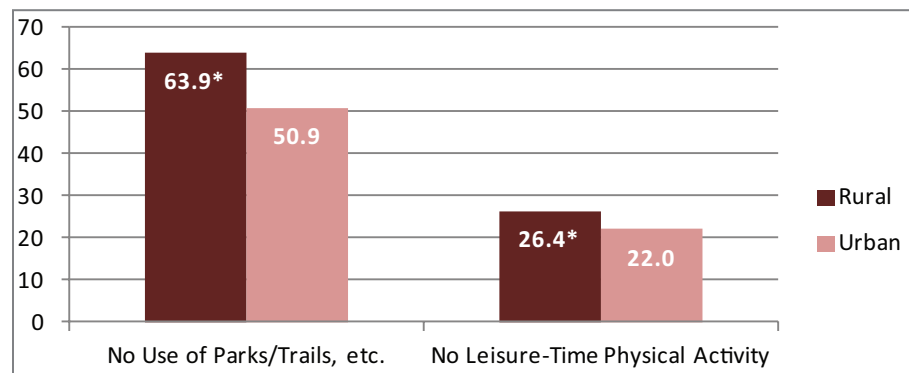
⁴⁹The Missouri rural and urban data in this chapter were provided by the Office of Epidemiology.

⁵⁰Centers for Disease Control and Prevention. (Last updated 2012, November 16). *Chronic disease prevention and health promotion – Tobacco use*. Accessed 2013, August 21, from <http://www.cdc.gov/chronicdisease/resources/publications/AAG/osh.htm>.

Lack of Physical Activity

Lack of physical activity is associated with many negative health conditions including joint pain, depression, cardiac problems, and diabetes, among others.⁵¹ Somewhat counterintuitively, rural residents report not using walking trails, parks, playgrounds, or sports fields for physical activity and report a lack of leisure-time physical activity at statistically significantly higher rates than their urban counterparts. While an estimated 63.9 percent of rural residents report not using trails, parks, etc., only 50.9 percent of urban residents report the same, a percentage difference of 25.5 percent. Rural residents also report not participating in leisure-time physical activity during the past 30 days at a higher rate (26.4 percent) than residents of urban counties (22.0 percent).

**Selected Lack of Physical Activity Risk Factors
Missouri, 2011**



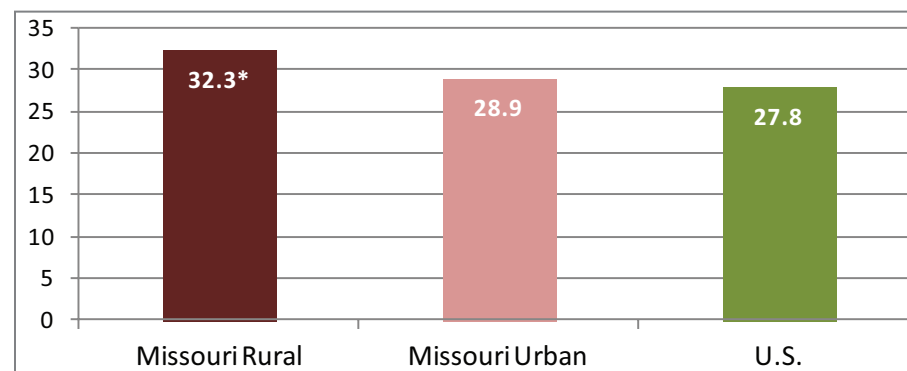
Estimates per 100 Residents

Source: Missouri County-Level Study, 2011

Obesity

Obesity, defined as a Body Mass Index (BMI) of 30.0 or greater, is related to an increased risk of heart disease, stroke, diabetes, and certain types of cancer.⁵² A significantly higher percentage of rural Missourians are considered obese compared to urban Missourians (32.3 percent versus 28.9 percent). Both the rural and the urban percentages exceed the national obesity prevalence of 27.8 percent.

**Obesity Rates
Missouri and U.S., 2011**



Estimates per 100 Residents

Source: Missouri County-Level Study, 2011, and U.S. BRFSS, 2011

⁵¹Centers for Disease Control and Prevention. (Last updated 2011, February 16). *Physical activity – Physical activity and health*. Accessed 2013, September 16, from <http://www.cdc.gov/physicalactivity/everyone/health/index.html>.

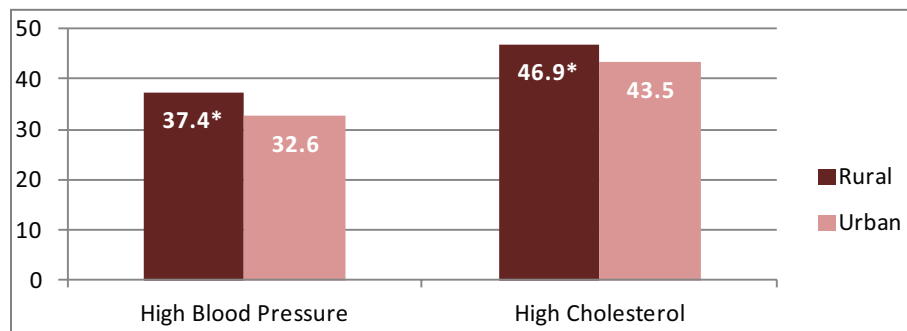
⁵²Centers for Disease Control and Prevention. (Last updated 2013, August 16). *Overweight and obesity – Adult obesity facts*. Accessed 2013, August 21, from <http://www.cdc.gov/obesity/data/adult.html#Common>.

High Blood Pressure and High Cholesterol

High blood pressure and high cholesterol are risk factors for many negative health outcomes, including heart disease and stroke. An estimated 37.4 percent of rural Missouri adults report having been told by a doctor or other health professional that they have elevated blood pressure. This is statistically significantly higher than the 32.6 percent estimate for urban residents.

A similar pattern exists for high cholesterol. Estimates are gathered for Missouri residents ages 35 and above who report having had their cholesterol checked. Among rural residents, 46.9 percent report having been told their cholesterol is high. This compares with 43.5 percent of urban residents. The difference between the rural and urban rates is statistically significant.

**Selected Risk Factors for Heart Disease and Stroke
Missouri, 2011**

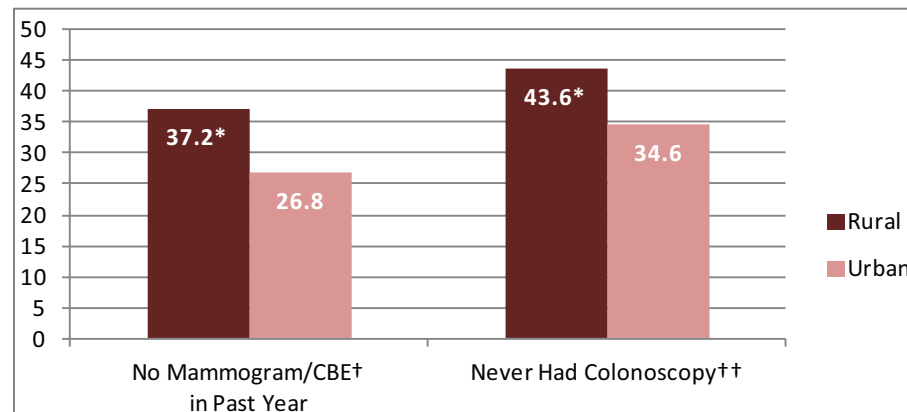


Estimates per 100 Residents
Source: Missouri County-Level Study, 2011

Lack of Health Screening

Receiving appropriate health screenings, such as mammograms and colonoscopies, is a way to identify and combat potentially lethal health conditions before they become life threatening.⁵³ Surveying indicates that 26.8 percent of urban women ages 40 and above report not receiving a mammogram or breast exam in the past year, while 37.2 percent of rural women report not receiving these exams, a percentage difference of 38.8 percent. In addition, 12.7 percent of rural women ages 40 and over report never having a mammogram, compared to 8.2 percent of urban women. Similarly, 43.6 percent of rural residents report never receiving a colonoscopy, compared to 34.6 percent of their urban counterparts. All of the differences related to the urban and rural screening rates are statistically significant.

**Selected Lack of Screening Risk Factors
Missouri, 2011**



Estimates per 100 Residents
Source: Missouri County-Level Study, 2011

*Women ages 40+
**Adults ages 50+

⁵³Centers for Disease Control and Prevention. (Last updated 2013, February 26). *Colorectal (colon) cancer – Colorectal cancer screening guidelines*. Accessed 2013, August 21, from http://www.cdc.gov/cancer/colorectal/basic_info/screening/guidelines.htm

HEALTH CARE RESOURCES

Health care resources are key elements in the maintenance of health and the prevention and treatment of disease. Basic access to primary care physicians and dentists, hospital services, and specialty care services improve overall health and contribute significantly to an area's economic vitality.

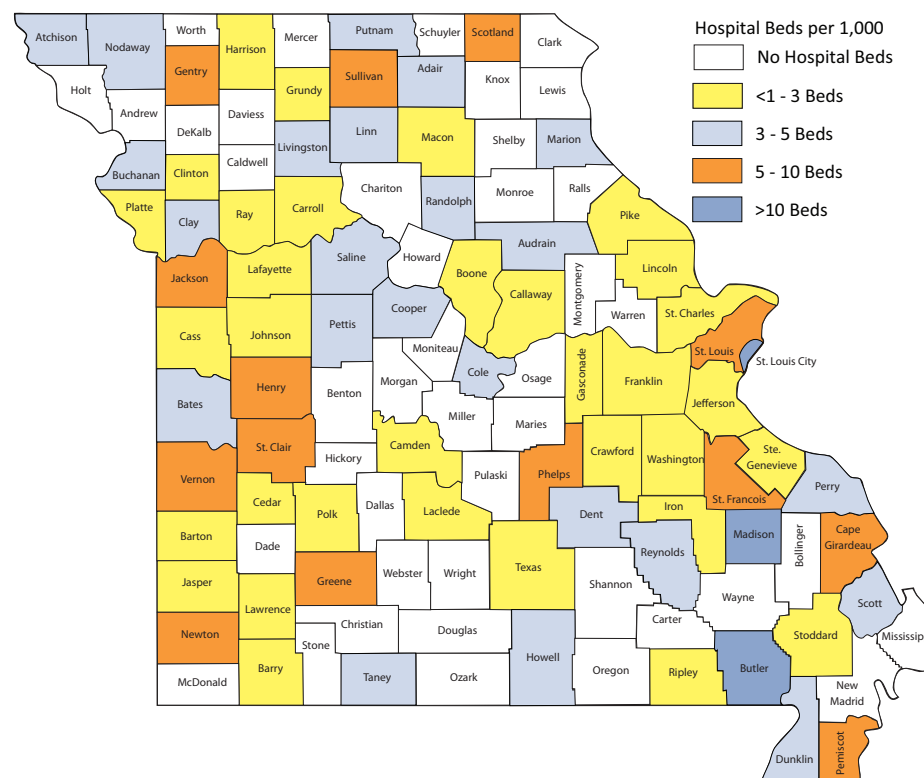
Unfortunately in rural Missouri these resources are limited, even for those who have health insurance, have no financial difficulty, and have access to transportation. In terms of Hospital and Specialty Services and Primary Care services, differences between urban and rural are stark.

Hospital and Specialty Services

At the time of this report there are 166 licensed hospitals in Missouri. Of those, only 41 percent (76 total) are located in rural counties, leaving 41 rural counties without a hospital. Of the 76 rural hospitals, 35 are Critical Access Hospitals (CAH), with 25 or less critical access beds. In total, Urban areas have (4.8) beds per 1,000 residents and rural areas have (2.5) beds per 1,000 residents (Map 9). Additionally, of the 109 licensed Ambulatory Surgical Centers in Missouri, only 23 are located in rural counties.

The lack of hospital and specialty services in rural Missouri is one of the contributors to rural Missourians' lower rate of hospitalizations outlined in the Health Status section of this report. Rural Missourians generally have to travel excessive distances to obtain specialty care, such as cardiology, oncology and nephrology. Given the lower incomes and increased age of rural residents the lack of local services can mean no access to or less consistent care for vulnerable populations.

**Number of Staffed Hospital Beds
Per 1,000 Residents**



Source: Missouri Department of Health and Senior Services, Bureau of Health Care Analysis and Data Dissemination, 2009 Hospital Utilization Survey

Primary Medical Care

Primary Medical Care is crucial to the overall health of a population. The regular availability of primary care physicians improve health outcomes and decrease health costs.⁵⁴

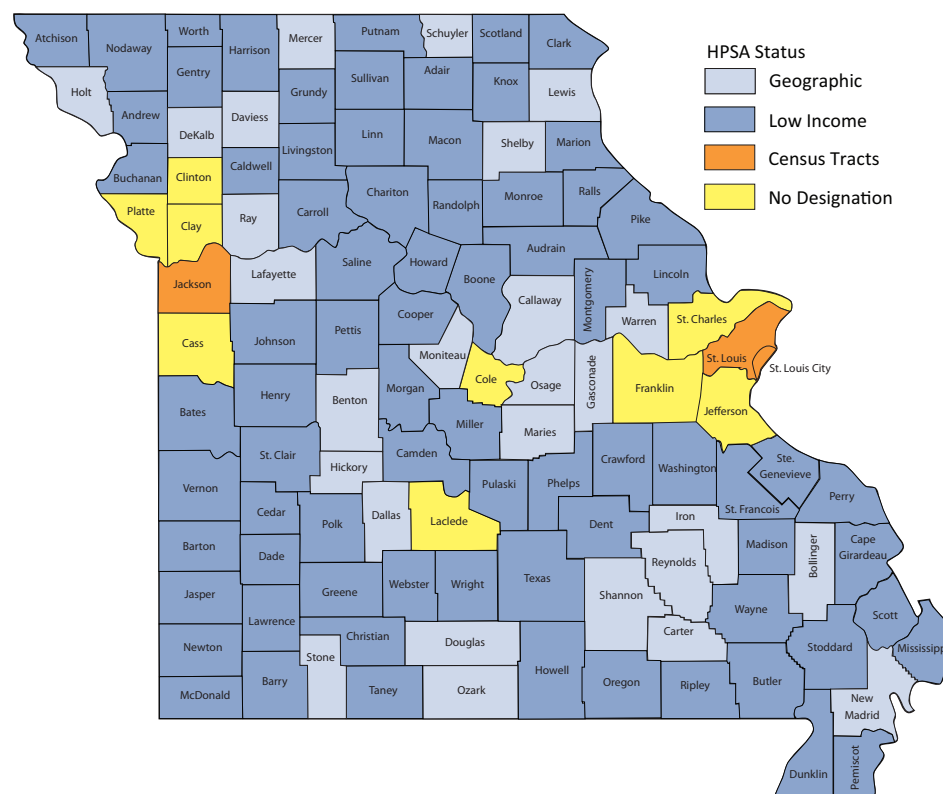
The best way to holistically view access to primary health care services is through Federally designated Health Professional Shortage Areas (HPSAs). Through State collected data and State created service areas, HPSAs utilize a ratio between a given population and health care providers, set against a standard measure, to determine access to health care providers in a given service area. HPSA designations consider a wide range of factors, and include a diverse set of data sources such as Missouri Professional Registration data, Census Bureau data, and Geographic Information System data.

There are predominately two types of HPSAs in Missouri: Geographic and Low-Income. Geographic HPSAs represent limited access for a whole population in a given area, while Low-Income HPSAs represent limited access for the part of the population below 200% of the Federal Poverty Level in a given area.

Primary Medical HPSAs are defined using a ratio between the general population and the number, in Full Time Equivalents (FTE), of licensed Primary Care Physicians (Allopathic and Osteopathic Doctors who specialize in Family Practice, General Practice, Pediatrics, Internal Medicine, and Obstetrics/Gynecology). Generally for a Geographic HPSA there is a ratio of at least 3,500:1 and for a Low-Income HPSA there is a ratio of at least 3,000:1.

Of the 101 rural counties in Missouri, 98 are considered Primary Medical HPSAs.

Primary Medical Care Health Professional Shortage Areas - 2013



⁵⁴Council on Graduate Medical Education, Twentieth Report, *Advancing Primary Care*, 2010

Primary Care Mental Health

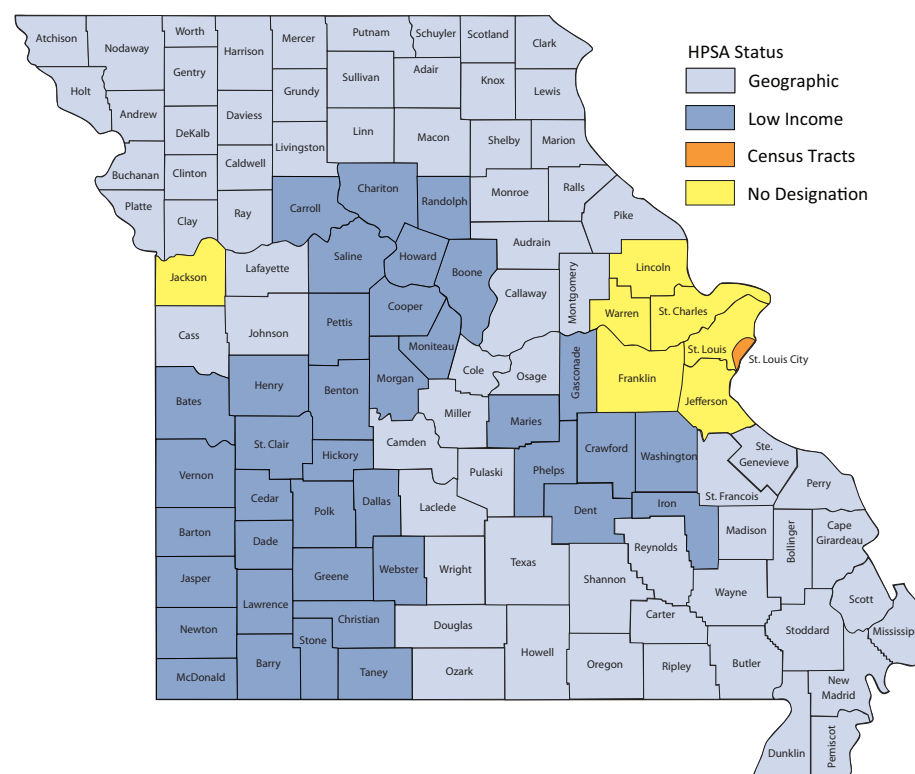
Mental and substance-use illnesses are the leading cause of combined death and disability for women of all ages and the second leading cause for men.⁵⁵ Access to appropriate resources is critical to the proper recovery and treatment of mental health problems and disorders.

In Missouri, Primary Care Mental HPSAs are defined using a ratio between the general population and the number (FTE) of licensed Psychiatrists (Allopathic and Osteopathic). Generally for a Geographic HPSA there is a ratio of at least 30,000:1 and for a Low-Income HPSA there is a ratio of at least 20,000:1.

Nearly all rural counties, 98 in total, are considered Mental HPSAs. The majority of these HPSAs are Geographic.



Primary Care Mental Health Professional Shortage Areas - 2013



⁵⁵Institute of Medicine, *Improving the Quality of Health Care for Mental and Substance-Use Conditions: Quality Chasm Series* (2006)

Primary Care Dentists

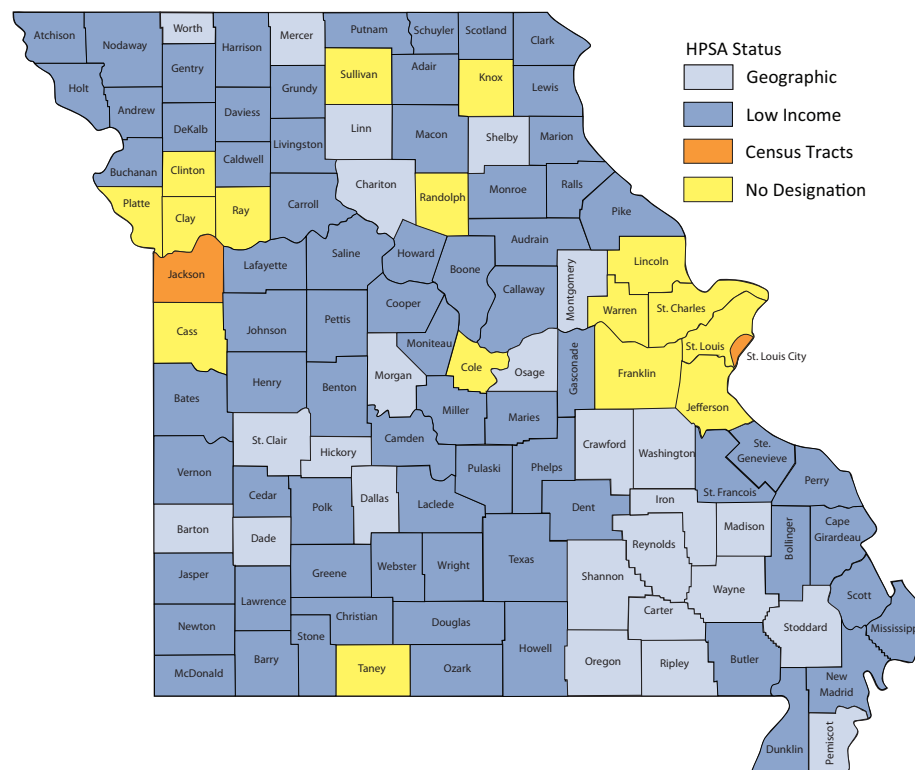
As stated earlier, oral health is critical to general health and well-being. All Missourians can have good oral health with basic oral hygiene practices and access to care; unfortunately, access to primary care dentists is severely limited throughout most of rural Missouri.

Dental HPSAs are defined using a ratio between the general population and the number (FTE) of licensed general, or pediatric, Doctors of Dental Surgery (DDS) or Doctors of Dental Medicine (DMD). Generally for a Geographic Dental HPSA there is a ratio of at least 5,000:1 and for a Low-Income HPSA there is a ratio of at least 4,000:1.

Access to dental services is most limited for low-income rural Missourians; however a large section of rural Southeast Missouri displays limited access for the entire population. In total, 92 rural counties are Dental HPSAs.



Dental Health Professional Shortage Areas - 2013



RECOMMENDATIONS

As demonstrated throughout this report, rural Missourians face many challenges related to their health. Overcoming the long standing inequality in health between urban and rural Missourians will require a holistic approach; there is no “silver bullet”. In light of this, the Office makes the following two recommendations.

First, state regulations and policies need to consider the varying degrees of difference between urban and rural areas/residents. Differences on the surface are easy to ascertain (rural residents having to drive farther for services for instance), but some may need serious deliberation and research. In terms of economics, education, natural resources, social services, and technology, rural areas present a unique set of challenges. This is especially true as it relates to rural health. Regulations and policies that may be good for hospitals and health care providers in large urban areas, who face many unique challenges of their own, may not be good for small rural hospitals or providers that may have severely limited resources and serve a small population that is characterized by lack of insurance and lower levels of income.

Second, access to health care services must be improved, and at the very least sustained, throughout rural Missouri. As described in the Health Care Resources section of this report, access to health care services is limited for rural Missourians, even if an individual has health insurance, adequate transportation, and other financial resources. Nearly all rural counties are considered Primary Care Health Professional Shortage Areas, with the only non-designated counties being adjacent to urban counties. The cost of this lack of care is apparent in the Health Status section of this report.

Addressing the access to care problem will require activities at many levels, including educating youth in health professional careers, supporting schools that offer health professional career training, recruiting and retaining practicing health professionals, actively forecasting and projecting the level of professionals required to support rural Missourians, supporting and encouraging professionals to work in defined areas of need, refining care models to allow for access, utilizing technology to bridge the large geographic spread of rural Missouri, and improving rural residents’ financial ability to pay for health care services.

Recommendations:

Policy development should consider that rural areas are unique and require a different set of tools to improve health.

Access to healthcare services, especially primary healthcare services, must be increased in order to improve the health of rural Missourians.

STATE OFFICE OF RURAL HEALTH ACTIVITIES

The program and activity areas of the Office are designed to support the health of rural communities. Although health care providers and health systems are often the primary recipients of the technical assistance or services provided by the Office, all members of the rural community are necessary partners and participants in the overall efforts.

The specific programs and functions are described in detail in this chapter.

Rural Health Innovation Award

The Rural Health Innovation Awards are designed to encourage and support the development and implementation of innovative strategies to improve health in rural Missouri. This includes efforts to increase access to healthcare services through the provision of direct health services, the development of programs to promote healthy lifestyles and self-management of disease, and capacity building efforts to increase the organizational effectiveness of community health organizations.

In State Fiscal Year (SFY) 2013 four rural organizations were awarded up to \$25,000 towards their innovative efforts:

- Burrell Behavioral Health in Springfield received \$25,000 for the purchase and implementation of tele-psychotherapy equipment. This equipment gives rural homebound seniors access to behavioral health services via a mobile unit that connects directly to providers at the main clinic. These services help alleviate the burden of transportation faced by many rural residents.
- On My Own, Inc. in Nevada received \$18,856 to assist a five county group of communities with advocacy, peer support, information and referral for independent living skills training. This includes the development of a community resource guide for independent living.

- Ozarks Medical Center (OMC) in West Plains received \$16,000 to fund two tele-psychiatry units for use in Rural Health Clinics in Gainesville and Alton. The addition of these two units improves access to psychiatric care in significantly underserved rural areas. Through these units patients receive baseline assessments, medication rechecks and emergency sessions.
- Randolph County Caring Community in Moberly received \$25,000 to purchase client management software, physical fitness equipment and educational materials. These purchases will improve access to health care and other vital services through resources and referrals, as well as giving community members an option to increase their physical activity.



Hospital Quality Improvement

The Medicare Beneficiary Quality Improvement Project (MBQIP) is the primary quality improvement project in the Office. The goal of MBQIP is to support Critical Access Hospitals (CAHs); the 36 CAHs in Missouri are hospitals that have 25 or fewer beds and are located in rural areas. CAHs are supported in implementing hospital specific quality improvement initiatives (such as increasing the number of patients who receive treatment for heart attacks within a standard time period), improving and integrating emergency management systems, supporting health system development and community engagement, and in developing and implementing rural health networks.

Specifically through MBQIP, the Office supports CAHs with technical assistance to improve health care outcomes on measures included in Hospital Compare and other national benchmarks. Hospital Compare, created through the Centers for Medicare and Medicaid Services, along with the Hospital Quality Alliance, is a consumer-oriented website that provides information on how well hospitals provide recommended care to their patients. Participating CAHs report on a specific set of annual measures and engage in quality improvement projects to benefit patient care.

The Office also supports CAHs with technical assistance to improve their financial and operational outcomes. Technical assistance is provided by conducting a financial analysis of Missouri CAHs and performing comprehensive financial assessments for CAHs considered to be “distressed” under the analysis; identifying revenue cycle performance improvement initiatives; and monitoring improvement efforts. An online financial sharing/learning network among CAHs regarding financial performance improvement is also in development.

Small Rural Hospital Improvement Program

The Small Rural Hospital Improvement Program is a federally funded program in which the Office provides funding to small rural hospitals for a variety of operational improvement projects. To be eligible for funding, a hospital must have 49 staffed beds or less and be located outside a Metropolitan Statistical Area (i.e. in a rural area).

During State Fiscal Year 2013, \$357,604.00 was distributed among 40 hospitals to pay for costs related to 1) implementation of the Prospective Payment System (PPS), 2) Accountable Care Organization (ACO) modeling, 3) Payment Bundling for financial improvement, and 4) Value-Based Purchasing (VBP) for financial improvement. The majority of funds were used for purchases under the ACO category related to improving quality outcomes (67 percent), PPS implementation (17 percent), VBP (10 percent) and Payment Bundling (5 percent). The majority of these purchases consist of software, hardware, education and training pertaining to electronic health record implementation.

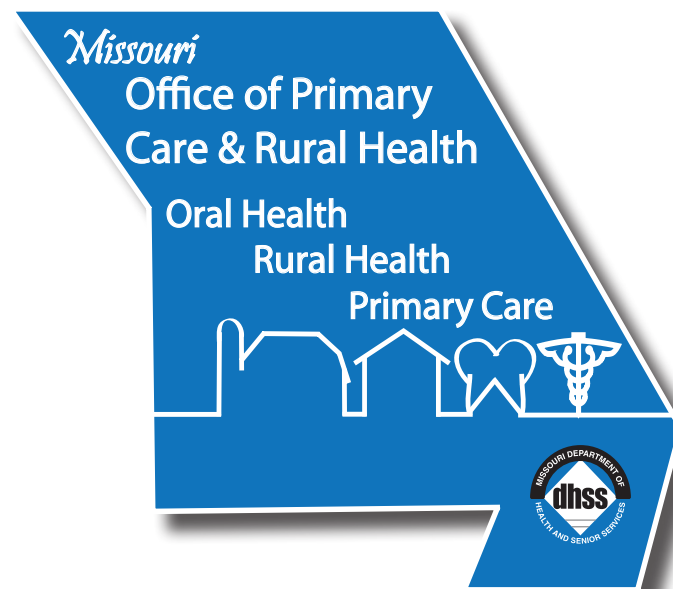
Information Dissemination

A primary function within the Office is to facilitate the collection and dissemination of information to rural areas. The Office completes this function through the following mechanisms:

- The Rural Spotlight is a bi-monthly Office publication containing health information as it relates to rural Missourians and includes dietary, safety, or other focused topics. Hard copies of the newsletters are mailed to 4,000 rural day care providers, hospice, home health agencies, long-term care providers, hospitals, rural health clinics, fire departments, ambulance districts, local public health agencies and contractors of the OPCRH. Electronic copies are available at <http://health.mo.gov/living/families/ruralhealth/publications.php>.
- In coordination with the National Organization of State Offices of Rural Health (NOSORH), the Office utilizes TruServe, a web-based tracking tool created by the University of South Dakota, to track technical assistance and information dissemination activities. During State Fiscal Year 13 (July 1, 2012-June 30, 2013) the Office assisted with a total of 1,297 technical assistance inquiries, which included 1089 in depth telephone and email interactions, 25 webinars, 38 teleconferences, 5 face to face and 140 other types of technical assistance through mail, website, and presentations. These technical assistance calls involved 6,135 different entities or individuals including 138 communities, 10 government officials, 2,360 academic institution staff, 28 associations, 2,288 health clinic staff, 148 hospitals, 725 healthcare providers and 438 other types of entities or individuals including students, private individuals, and concerned citizens.
- The Office continues to maintain a web based healthcare resource directory, http://gis.dhss.mo.gov/Website/AGS_healthFacilityhealthFacilityhtml which allows searches to find health resources including rural hospitals, rural health clinics and federally qualified health centers. This website provides a one-stop place to search for health care providers in any area of the state of Missouri.

Collaborations

The Office is located within the Missouri Department of Health and Senior Services, Office of Primary Care and Rural Health, which includes the State Office of Rural Health, the Primary Care Office, and the Missouri Oral Health Program. This organizational structure presents a unique environment in which to engage in close collaboration on a multitude of projects; the efforts of these two partner Offices will be briefly outlined here.



Primary Care Office

The Primary Care Office (PCO) promotes federal, state, local, and private collaboration in expanding comprehensive, community-based primary health care services for medically underserved populations. The PCO monitors and evaluates access to health care services, including designation of Health Professional Shortage Areas. The PCO is also the primary state contact for the National Health Service Corps, J-1 Visa Waiver Program, National Interest Waiver Program and works with local, state and federal partners in the development and expansion of safety-net health care delivery sites.

The PCO implements programs that directly address the shortage of primary health care providers statewide. The Primary Care Resource Initiative for Missouri (PRIMO), the Missouri Professional and Practical Nursing Student Loan (NSL), and State Loan Repayment Program (SLRP) provide either scholarship or loan repayment to primary health care providers in return for the provision of health care services in a defined area of need. Funding is also provided to community organizations to develop healthcare services in areas where services are currently unavailable and to expand existing health care services for disparaged populations, and provides support to Area Health Education Centers for the development of health professional students, especially those individuals from rural, inner city, and underserved communities in Missouri.

Oral Health

The Missouri Oral Health Program's (MOHP) mission is to improve the oral health of Missourians through education, prevention, and leadership. One main function within MOHP is the operation of the Preventive Services Program (PSP). The PSP is a community-driven oral health program for children and involves the participation of a variety of community partners such as schools, day care centers, Head Starts, and State Schools for the Severely Disabled. In the 2012-2013 school year, over 72,000 children were served. Each child received oral health education, age-appropriate oral health supplies (which may include toothbrush, toothpaste, and floss), a screening by a dental professional, and a referral for additional dental care if issues are identified. The MOHP also provides information for the public about community water fluoridation and collaborates with other programs and organizations that address access to oral health care in women, children, and other at-risk populations.

Other Internal/External Partners

Internal and External Partners and Networks are critical to the efforts of the Office; without these partners success would be severely compromised. Critical internal DHSS partners include the Bureau of Outpatient Healthcare, the Bureau of Healthcare Data Dissemination and Analysis, the Bureau of Chronic Disease, the Office of Minority Health, the Office on Women's Health, and the Bureau of Hospital Standards.

Critical external partners include the Missouri Hospital Association, the Missouri Primary Care Association, the Missouri Dental Association, the Missouri Association of Rural Health Clinics, the Department of Social Services, the Health Resources and Services Administration Office of Rural Health Policy, the Missouri Area Health Education Centers, the University of Missouri, and the Rural Recruitment and Retention Network.

GLOSSARY

Age-Adjusted Rates

Age adjusting rates is a way to make fairer comparisons between groups with different age distributions. For example, a county having a higher percentage of elderly people may have a higher rate of death or hospitalization than a county with a younger population, merely because the elderly are more likely to die or be hospitalized. (The same distortion can happen when comparing races, genders, or time periods.) Age adjustment can make the different groups more comparable.

A "standard" population distribution is used to adjust death and hospitalization rates. The age-adjusted rates are rates that would have existed if the population under study had the same age distribution as the "standard" population. Therefore, they are summary measures adjusted for differences in age distributions.

The National Center for Health Statistics recommends that the U.S. 2000 standard population be used when calculating age-adjusted rates. However, if you compare rates from different sources, it is very important that you use the same standard population on both sides of your comparison. **It is not legitimate to compare adjusted rates which use different standard populations.** Users of Missouri Information for Community Assessment (MICA) have the option of selecting age-adjusted rates based on the U.S. 1940, 1970 or 2000 standard populations when generating tables where age adjustment is utilized. Age-adjusted rates in the Community Data Profiles use the U.S. 2000 standard population.

Age-adjusted rates published elsewhere (e.g., in the annual Missouri Vital Statistics) may be slightly different from those found in the MICAs or Community Data Profiles, due to updating of population estimates for years between decennial Censuses. The constant or "per population" number used for the age-adjusted rates may vary, depending on the type of event. For example, the age-adjusted rates for deaths are per 100,000 population. However, age-adjusted rates for hospitalizations and procedures are per 10,000 population and age-adjusted rates for emergency department visits are per 1,000 population.

The use of different standard populations can also affect general trends in total mortality and cause of death and differences in mortality by race and gender. For more information on this topic see: "Effects of Changing from the 1940 to the Year 2000 Standard Population for Age-Adjusted Death Rates in Missouri": *Missouri Monthly Vital Statistics*, 33.12 (Feb. 2000).



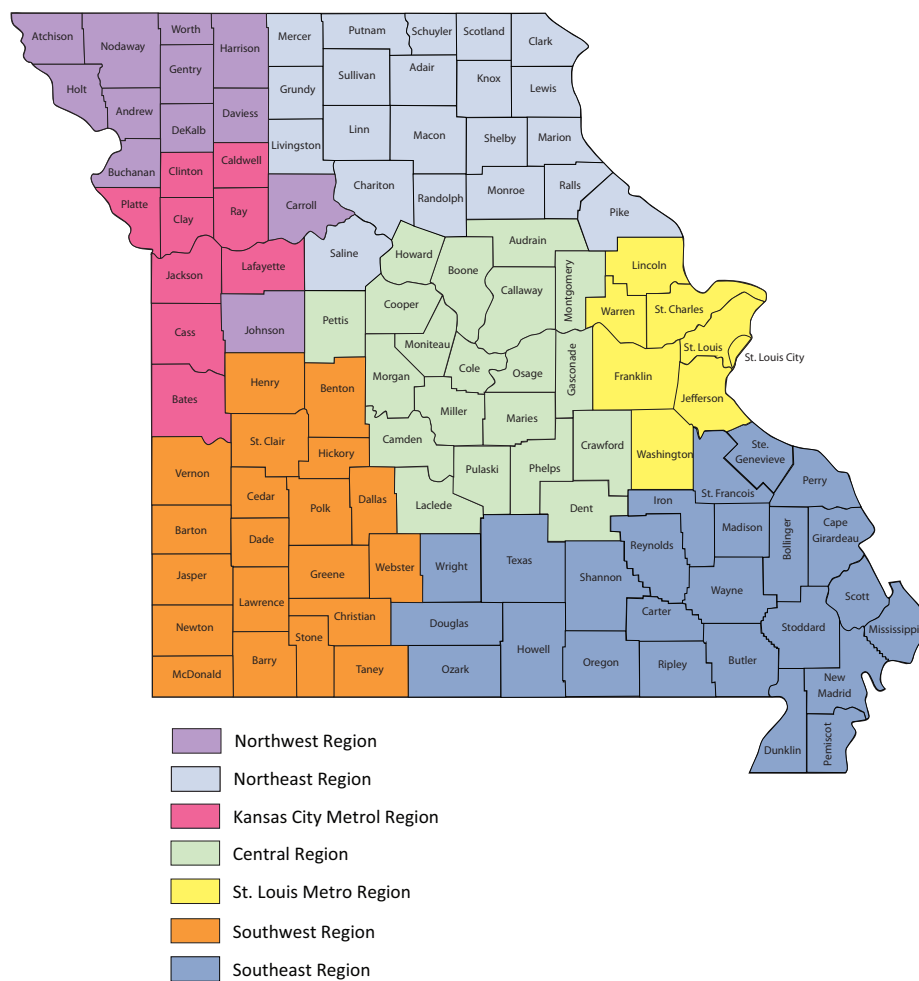
Behavioral Risk Factor Surveillance System (BRFSS)

The Behavioral Risk Factor Surveillance System (BRFSS) is an annual landline and cell telephone survey that collects information on health risk behaviors, preventive health practices, and health care access from non-institutionalized adults ages 18 and older. The annual BRFSS sample size of approximately 6,000 produces prevalence estimates at the state and regional levels.



File #822645

BRFSS Regions



Source: <http://www.health.mo.gov/data/brfss/BRFSSRegionsMap.pdf>

Body Mass Index

Body Mass Index (BMI) is an indicator of body fat. Persons with BMI values of 30.0 or greater are considered obese for Maternal and Child Health measures.

The Behavioral Risk Factor Surveillance System and Missouri County-Level Study derive Overweight (25.0 – 29.9 BMI) and Obese (≥ 30 BMI) indicators by calculating BMI using responses to the following questions:

- In coordination about how much do you weigh without shoes?
- About how tall are you without shoes?

Healthy People 2020

The Healthy People 2020 objectives are health status targets for the entire U.S. Targets are set using baseline U.S. data. Objectives are organized into 42 topic areas, with Leading Health Indicators identified in 12 of these topic areas. Additional information about Healthy People 2020 is available at <http://www.healthypeople.gov/2020/default.aspx>.

Missouri County-Level Study

The Missouri County-Level Study (CLS) is a BRFSS-like landline and cell telephone survey that was conducted in 2007 and 2011 with approximately 50,000 non-institutionalized adults ages 18 and older. Sufficient data were collected to produce prevalence estimates for each of the state's 114 counties and the City of St. Louis.

Resident

Resident means the person was a resident of Missouri at the time of the event in question (birth, death, emergency room visit, etc.). Data in the MICA (Missouri Information for Community Assessment) system are reported by resident status. For example, a record for a Missouri resident treated in a Kansas hospital would be reported as a Missouri hospitalization. Missouri receives vital records and hospital data from most of its border states.

Statistical Significance

Statistical significance tests are performed to determine whether the difference between two rates is probably the result of chance factors or if it is meaningful. All tests of statistical significance reported in this data book were computed using a 95 percent confidence interval.

Unstable Rates

Unstable rates are rates based on less than 20 events. They can be common for small population areas, such as certain counties, or for low-frequency events, such as cause-specific deaths or birth defects. If the use of data from one specified year is not required, combining multiple years of data can often generate a stable rate. Similarly, data from several counties can be combined to create a stable regional rate. In this report, eleven years of data were combined to calculate cause-specific death rates and death rates for subpopulations (by gender or age group). Five years of data were combined to calculate hospitalization rates for specific diagnoses and subpopulations.

APPENDIX A – Using the DHSS Community Data Profiles and MICA (Missouri Information for Community Assessment) Websites

Much of the health data represented in this report may be accessed on the Missouri Department of Health and Senior Services (DHSS) Community Data Profiles and MICA websites. Users can easily create different types of tables, graphs, charts, or maps pertaining to health indicators.

The following step-by-step guide offers detailed instructions on accessing health data on the DHSS Community Data Profiles website.

1. Go to the DHSS Community Data Profiles website: <http://health.mo.gov/data/CommunityDataProfiles/index.html>.
2. From the topic list, select a Profile. Then use the pull-down menu to choose whether to view data by city, county, or at the state level. (Note: The categories of rural and urban used in this report are not available for the Community Data Profiles. Data for the state, counties, and selected cities can be viewed. Data for BRFSS Regions are available for some topics.) Click the Submit button.
3. The requested data table will appear.
4. The Trend Line and Comparison Bar Graph columns provide links to available charts and graphs. Users can create a graph showing a three-year moving average trend line. In addition, users can create a bar chart showing the rates for a specific indicator in selected counties or compare indicators within a single geography.

The following step-by-step guide offers detailed instructions on accessing health disparities data on the DHSS MICA website.

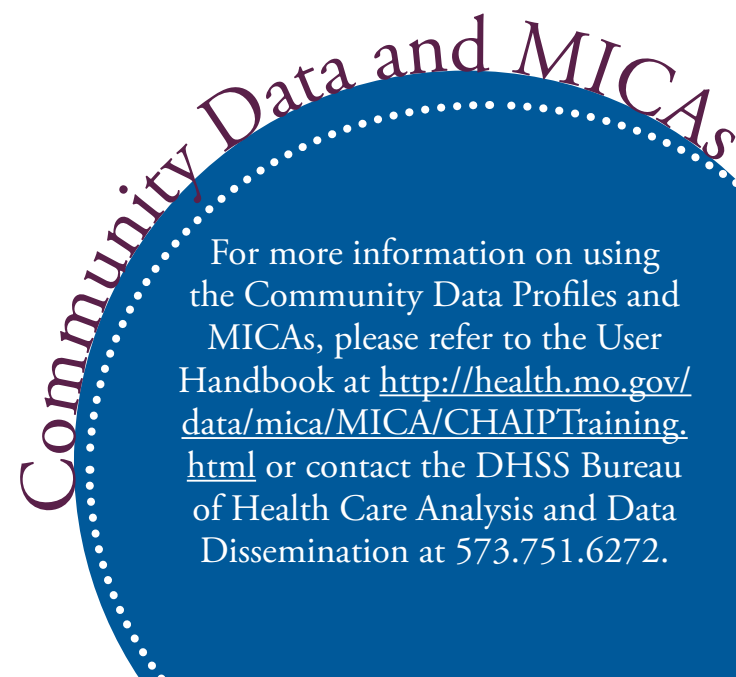
1. Go to the DHSS MICA website: <http://health.mo.gov/data/mica/MICA/>.
2. Choose a topic from the list of MICA data sets.
3. Select a viewing option. Options may include county/city tables, maps, or zip code tables. Each option provides a query screen that allows users to customize the data output.
4. Data for the rural and urban categories used in this report were viewed by selecting the appropriate counties in Step 5 of the query screen. If County/City is selected as the row or column variable in Step 1 or Step 2, the “Total for Selection” row or column represents the overall rural or urban data. The following table lists the rural and urban counties as categorized in this report.

Rural Counties

| | | |
|----------------|------------|-------------|
| Adair | Daviess | McDonald |
| Andrew | DeKalb | Macon |
| Atchison | Dent | Madison |
| Audrain | Douglas | Maries |
| Barry | Dunklin | Marion |
| Barton | Franklin | Mercer |
| Bates | Gasconade | Miller |
| Benton | Gentry | Mississippi |
| Bollinger | Grundy | Moniteau |
| Butler | Harrison | Monroe |
| Caldwell | Henry | Montgomery |
| Callaway | Hickory | Morgan |
| Camden | Holt | New Madrid |
| Cape Girardeau | Howard | Nodaway |
| Carroll | Howell | Oregon |
| Carter | Iron | Osage |
| Cedar | Johnson | Ozark |
| Chariton | Knox | Pemiscot |
| Christian | Laclede | Perry |
| Clark | Lafayette | Pettis |
| Clinton | Lawrence | Phelps |
| Cooper | Lewis | Pike |
| Crawford | Lincoln | Polk |
| Dade | Linn | Pulaski |
| Dallas | Livingston | Putnam |

Urban Counties

| |
|----------------|
| Boone |
| Buchanan |
| Cass |
| Clay |
| Cole |
| Green |
| Jackson |
| Jasper |
| Jefferson |
| Newton |
| Platte |
| St. Charles |
| St. Louis |
| St. Louis City |
| Ralls |
| Randolph |
| Ray |
| Reynolds |
| Ripley |
| St. Clair |
| St. Francois |
| Ste. Genevieve |
| Saline |
| Schuyler |
| Scotland |
| Scott |
| Shannon |
| Shelby |
| Stoddard |
| Stone |
| Sullivan |
| Taney |
| Texas |
| Vernon |
| Warren |
| Washington |
| Wayne |
| Webster |
| Worth |
| Wright |



For more information on using the Community Data Profiles and MICAs, please refer to the User Handbook at <http://health.mo.gov/data/mica/MICA/CHAIPTraining.html> or contact the DHSS Bureau of Health Care Analysis and Data Dissemination at 573.751.6272.

APPENDIX B – Death Numbers and Rates by Cause, Gender, and Age Group

| 2001-2011 Age-Adjusted Death Rates per 100,000 Residents | Rural Number | Rural Rate | Urban Number | Urban Rate |
|---|-------------------------|-----------------------|-------------------------|-----------------------|
| <i>All Causes</i> | 253,255 | 889.8 | 349,683 | 836.0 |
| Males | 126,820 | 1,059.8 | 167,372 | 998.5 |
| Females | 126,435 | 751.0 | 182,311 | 713.6 |
| Under 15 | 3,315 | 70.0 | 5,586 | 68.5 |
| 15 to 24 | 3,313 | 98.4 | 5,015 | 86.6 |
| 25 to 44 | 11,110 | 188.8 | 17,739 | 158.5 |
| 45 to 64 | 45,291 | 735.1 | 65,671 | 647.0 |
| 65 and Over | 190,218 | 5,142.9 | 255,632 | 5,075.0 |
| <i>Heart Disease</i> | 71,528 | 246.4 | 92,825 | 220.3 |
| Males | 35,668 | 300.6 | 44,548 | 273.1 |
| Females | 35,860 | 201.4 | 48,277 | 181.3 |
| Under 15 | 71 | 1.5 | 116 | 1.4 |
| 15 to 24 | 93 | 2.8 | 146 | 2.5 |
| 25 to 44 | 1,602 | 27.2 | 2,317 | 20.7 |
| 45 to 64 | 11,433 | 185.6 | 15,395 | 151.7 |
| 65 and Over | 58,329 | 1,577.0 | 78,842 | 1,485.8 |
| <i>Cancer</i> | 56,874 | 197.6 | 79,523 | 190.6 |
| Males | 30,876 | 243.6 | 40,211 | 233.1 |
| Females | 25,998 | 164.1 | 39,312 | 163.0 |
| Under 15 | 107 | 2.3 | 180 | 2.2 |
| 15 to 24 | 136 | 4.0 | 241 | 4.2 |
| 25 to 44 | 1,614 | 27.4 | 2,439 | 21.8 |
| 45 to 64 | 15,013 | 243.7 | 21,718 | 214.0 |
| 65 and Over | 40,002 | 1,081.5 | 54,942 | 1,090.8 |

APPENDIX B – continued

| | | | | |
|---|--------|-------|--------|-------|
| <i>Chronic lower respiratory disease (CLRD)</i> | 15,914 | 54.7 | 18,829 | 45.6 |
| Males | 8,316 | 68.5 | 8,490 | 52.8 |
| Females | 7,598 | 45.9 | 10,339 | 41.5 |
| Under 15 | 13 | 0.3 | 38 | 0.5 |
| 15 to 24 | 7 | 0.2 | 31 | 0.5 |
| 25 to 44 | 160 | 2.7 | 180 | 1.6 |
| 45 to 64 | 2,434 | 39.5 | 2,462 | 24.3 |
| 65 and Over | 13,300 | 359.6 | 16,116 | 319.9 |
| <i>Stroke</i> | 15,887 | 54.5 | 20,859 | 49.7 |
| Males | 6,184 | 53.7 | 7,842 | 49.7 |
| Females | 9,703 | 54.0 | 13,017 | 48.9 |
| Under 15 | 25 | 0.5 | 41 | 0.5 |
| 15 to 24 | 18 | 0.5 | 24 | 0.4 |
| 25 to 44 | 221 | 3.8 | 386 | 3.4 |
| 45 to 64 | 1,471 | 23.9 | 2,283 | 22.5 |
| 65 and Over | 14,152 | 382.6 | 18,125 | 359.8 |
| <i>Unintentional injuries</i> | 13,482 | 54.7 | 17,417 | 42.4 |
| Males | 8,595 | 73.4 | 10,673 | 57.7 |
| Females | 4,887 | 36.8 | 6,744 | 28.9 |
| Under 15 | 703 | 14.8 | 800 | 9.8 |
| 15 to 24 | 2,082 | 61.9 | 2,057 | 35.5 |
| 25 to 44 | 3,447 | 58.6 | 4,331 | 38.7 |
| 45 to 64 | 3,114 | 50.5 | 4,230 | 41.7 |
| 65 and Over | 4,135 | 111.8 | 5,995 | 119.0 |

APPENDIX B – continued

| | | | | |
|---|-------|-------|-------|-------|
| <i>Motor vehicle accidents (subset of Unintentional injuries)</i> | 6,255 | 26.1 | 5,137 | 12.6 |
| Males | 4,194 | 35.4 | 3,542 | 18.2 |
| Females | 2,061 | 16.9 | 1,595 | 7.5 |
| Under 15 | 276 | 5.8 | 203 | 2.5 |
| 15 to 24 | 1,580 | 46.9 | 1,333 | 23.0 |
| 25 to 44 | 1,780 | 30.3 | 1,600 | 14.3 |
| 45 to 64 | 1,485 | 24.1 | 1,214 | 12.0 |
| 65 and Over | 1,133 | 30.6 | 787 | 15.6 |
| <i>Alzheimer's disease</i> | 7,647 | 25.8 | 9,903 | 23.4 |
| Males | 2,334 | 21.9 | 2,723 | 19.1 |
| Females | 5,313 | 27.8 | 7,180 | 25.4 |
| Under 15 | 0 | 0.0 | 0 | 0.0 |
| 15 to 24 | 0 | 0.0 | 0 | 0.0 |
| 25 to 44 | 1 | 0.0 | 1 | 0.0 |
| 45 to 64 | 77 | 1.2 | 96 | 0.9 |
| 65 and Over | 7,568 | 204.6 | 9,806 | 194.7 |
| <i>Pneumonia and influenza</i> | 6,941 | 23.8 | 8,645 | 20.5 |
| Males | 3,089 | 27.8 | 3,748 | 24.7 |
| Females | 3,852 | 21.2 | 4,897 | 17.9 |
| Under 15 | 48 | 1.0 | 51 | 0.6 |
| 15 to 24 | 24 | 0.7 | 18 | 0.3 |
| 25 to 44 | 137 | 2.3 | 186 | 1.7 |
| 45 to 64 | 619 | 10.0 | 726 | 7.2 |
| 65 and Over | 6,113 | 165.3 | 7,662 | 152.1 |

APPENDIX B – continued

| | | | | |
|-----------------------|-------|-------|-------|-------|
| <i>Diabetes</i> | 6,701 | 23.3 | 9,525 | 22.8 |
| Males | 3,248 | 26.3 | 4,645 | 26.9 |
| Females | 3,453 | 20.8 | 4,880 | 19.7 |
| Under 15 | 6 | 0.1 | 6 | 0.1 |
| 15 to 24 | 15 | 0.4 | 31 | 0.5 |
| 25 to 44 | 220 | 3.7 | 395 | 3.5 |
| 45 to 64 | 1,406 | 22.8 | 2,343 | 23.1 |
| 65 and Over | 5,054 | 136.6 | 6,749 | 134.0 |
| <i>Kidney disease</i> | 5,592 | 19.2 | 7,133 | 17.0 |
| Males | 2,683 | 23.5 | 3,345 | 21.0 |
| Females | 2,909 | 16.5 | 3,788 | 14.6 |
| Under 15 | 14 | 0.3 | 19 | 0.2 |
| 15 to 24 | 7 | 0.2 | 14 | 0.2 |
| 25 to 44 | 81 | 1.4 | 145 | 1.3 |
| 45 to 64 | 616 | 10.0 | 1,006 | 9.9 |
| 65 and Over | 4,874 | 131.8 | 5,949 | 118.1 |
| <i>Suicide</i> | 3,437 | 14.4 | 5,150 | 12.6 |
| Males | 2,885 | 24.3 | 4,001 | 20.8 |
| Females | 582 | 5.0 | 1,149 | 5.4 |
| Under 15 | 30 | 0.6 | 49 | 0.6 |
| 15 to 24 | 407 | 12.1 | 660 | 11.4 |
| 25 to 44 | 1,202 | 20.4 | 1,863 | 16.6 |
| 45 to 64 | 1,165 | 18.9 | 1,837 | 18.1 |
| 65 and Over | 633 | 17.1 | 741 | 14.7 |

APPENDIX C – Hospitalization Numbers and Rates by Cause, Gender, and Age Group

| 2007-2011 Age-Adjusted Hospitalization Rates per 10,000 Residents | Rural Number | Rural Rate | Urban Number | Urban Rate |
|--|-----------------|---------------|-----------------|---------------|
| <i>All Causes</i> | 1,430,088 | 1,185.1 | 2,353,034 | 1,221.9 |
| Males | 598,786 | 1,026.9 | 950,236 | 1,083.9 |
| Females | 831,301 | 1,358.3 | 1,402,792 | 1,361.7 |
| Under 15 | 80,749 | 372.0 | 126,164 | 341.3 |
| 15 to 24 | 127,854 | 833.4 | 214,304 | 804.9 |
| 25 to 44 | 255,369 | 969.6 | 519,222 | 1,035.1 |
| 45 to 64 | 377,916 | 1,263.4 | 652,636 | 1,321.7 |
| 65 and Over | 588,196 | 3,353.6 | 840,676 | 3,540.2 |
| <i>Heart Disease</i> | 185,423 | 139.5 | 267,510 | 134.8 |
| Males | 98,444 | 161.7 | 196,889 | 227.3 |
| Females | 86,979 | 119.4 | 199,185 | 177.4 |
| Under 15 | 331 | 1.5 | 615 | 1.7 |
| 15 to 24 | 807 | 5.3 | 1,458 | 5.5 |
| 25 to 44 | 11,274 | 42.8 | 20,806 | 41.5 |
| 45 to 64 | 59,386 | 198.5 | 95,017 | 192.4 |
| 65 and Over | 113,625 | 647.8 | 149,614 | 630.0 |
| <i>Cancer</i> | 46,662 | 35.0 | 73,883 | 36.9 |
| Males | 23,753 | 37.5 | 36,631 | 40.9 |
| Females | 22,909 | 33.3 | 37,252 | 34.1 |
| Under 15 | 553 | 2.5 | 832 | 2.3 |
| 15 to 24 | 417 | 2.7 | 686 | 2.6 |
| 25 to 44 | 3,083 | 11.7 | 5,365 | 10.7 |
| 45 to 64 | 17,592 | 58.8 | 30,445 | 61.7 |
| 65 and Over | 25,017 | 142.6 | 36,555 | 153.9 |

APPENDIX C – continued

| | | | | |
|--|--------|-------|--------|-------|
| <i>Chronic obstructive pulmonary disease (COPD) and bronchiectasis</i> | 39,826 | 29.6 | 38,694 | 19.4 |
| Males | 17,484 | 28.2 | 16,146 | 18.6 |
| Females | 22,342 | 31.6 | 22,548 | 20.3 |
| Under 15 | 218 | 1.0 | 107 | 0.3 |
| 15 to 24 | 187 | 1.2 | 295 | 1.1 |
| 25 to 44 | 1,722 | 6.5 | 1,423 | 2.8 |
| 45 to 64 | 13,850 | 46.3 | 14,159 | 28.7 |
| 65 and Over | 23,849 | 136.0 | 22,710 | 95.6 |
| <i>Stroke</i> | 38,418 | 28.4 | 60,222 | 30.3 |
| Males | 18,422 | 30.3 | 27,523 | 32.5 |
| Females | 19,996 | 26.8 | 32,699 | 28.6 |
| Under 15 | 59 | 0.3 | 121 | 0.3 |
| 15 to 24 | 100 | 0.7 | 198 | 0.7 |
| 25 to 44 | 1,360 | 5.2 | 2,813 | 5.6 |
| 45 to 64 | 10,187 | 34.1 | 17,827 | 36.1 |
| 65 and Over | 26,712 | 152.3 | 39,263 | 165.3 |
| <i>Unintentional injuries</i> | 68,285 | 56.1 | 98,859 | 51.1 |
| Males | 32,113 | 57.7 | 45,465 | 52.4 |
| Females | 36,172 | 52.5 | 53,393 | 47.9 |
| Under 15 | 3,912 | 18.0 | 5,785 | 15.7 |
| 15 to 24 | 6,064 | 39.5 | 8,223 | 30.9 |
| 25 to 44 | 10,285 | 39.1 | 15,580 | 31.1 |
| 45 to 64 | 15,492 | 51.8 | 22,959 | 46.5 |
| 65 and Over | 32,532 | 185.5 | 46,304 | 195.0 |

APPENDIX C – continued

| | | | | |
|--|---------------|---------------|---------------|---------------|
| <i>Motor vehicle traffic accidents</i> | 11,959 | 10.9 | 15,481 | 8.2 |
| Males | 7,283 | 13.3 | 9,576 | 10.5 |
| Females | 4,676 | 8.5 | 5,904 | 6.0 |
| Under 15 | 537 | 2.5 | 756 | 2.0 |
| 15 to 24 | 2,943 | 19.2 | 3,712 | 13.9 |
| 25 to 44 | 3,573 | 13.6 | 4,899 | 9.8 |
| 45 to 64 | 3,192 | 10.7 | 4,071 | 8.2 |
| 65 and Over | 1,714 | 9.8 | 2,039 | 8.6 |
| <i>Alzheimer's disease</i> | 5,446 | 4.0 | 6,944 | 3.6 |
| Males | Not available | Not available | Not available | Not available |
| Females | Not available | Not available | Not available | Not available |
| Under 15 | Not available | Not available | Not available | Not available |
| 15 to 24 | Not available | Not available | Not available | Not available |
| 25 to 44 | Not available | Not available | Not available | Not available |
| 45 to 64 | Not available | Not available | Not available | Not available |
| 65 and Over | Not available | Not available | Not available | Not available |
| <i>Pneumonia</i> | 63,136 | 49.7 | 69,544 | 35.8 |
| Males | 29,946 | 52.3 | 31,619 | 37.6 |
| Females | 33,190 | 48.4 | 37,925 | 34.8 |
| Under 15 | 7,361 | 33.9 | 7,734 | 20.9 |
| 15 to 24 | 1,074 | 7.0 | 1,453 | 5.5 |
| 25 to 44 | 4,321 | 16.4 | 6,147 | 12.3 |
| 45 to 64 | 13,798 | 46.1 | 17,303 | 35.0 |
| 65 and Over | 36,582 | 208.6 | 36,907 | 155.4 |

APPENDIX C – continued

| | | | | |
|--|--------|------|---------|-------|
| <i>Diabetes</i> | 18,128 | 15.4 | 36,461 | 18.9 |
| Males | 9,109 | 15.9 | 18,663 | 20.7 |
| Females | 9,019 | 15.0 | 17,798 | 17.4 |
| Under 15 | 914 | 4.2 | 1,543 | 4.2 |
| 15 to 24 | 1,810 | 11.8 | 3,295 | 12.4 |
| 25 to 44 | 3,809 | 14.5 | 8,619 | 27.3 |
| 45 to 64 | 6,258 | 20.9 | 13,501 | 40.0 |
| 65 and Over | 5,337 | 30.4 | 9,503 | 18.9 |
| <i>Kidney disease</i> | 15,762 | 11.9 | 32,899 | 16.6 |
| Males | 7,832 | 13.4 | 16,064 | 19.0 |
| Females | 7,930 | 10.7 | 16,835 | 14.7 |
| Under 15 | 181 | 0.8 | 242 | 0.6 |
| 15 to 24 | 200 | 1.2 | 517 | 1.9 |
| 25 to 44 | 943 | 3.6 | 2,576 | 5.2 |
| 45 to 64 | 4,208 | 14.0 | 9,871 | 20.0 |
| 65 and Over | 10,230 | 58.3 | 19,693 | 82.9 |
| <i>Affective disorders</i> | 61,280 | 58.2 | 114,956 | 62.1 |
| Males | 26,039 | 48.9 | 51,268 | 56.6 |
| Females | 35,241 | 67.7 | 63,688 | 67.3 |
| Under 15 | 7,094 | 32.7 | 14,258 | 38.6 |
| 15 to 24 | 13,759 | 89.7 | 27,093 | 101.8 |
| 25 to 44 | 21,664 | 82.3 | 38,425 | 76.6 |
| 45 to 64 | 14,691 | 49.1 | 28,101 | 56.9 |
| 65 and Over | 4,070 | 23.2 | 7,079 | 29.8 |
| <i>Alcohol- and substance-related mental disorders</i> | 14,730 | 14.0 | 35,747 | 19.2 |
| Males | 9,433 | 17.7 | 24,087 | 26.5 |
| Females | 5,297 | 10.3 | 11,660 | 12.2 |

APPENDIX C – continued

| | | | | |
|-------------------|---------------|-------------|---------------|-------------|
| Under 15 | 64 | 0.3 | 51 | 0.1 |
| 15 to 24 | 1,821 | 11.9 | 3,742 | 14.1 |
| 25 to 44 | 6,618 | 25.1 | 16,194 | 32.3 |
| 45 to 64 | 5,295 | 17.7 | 13,833 | 28.0 |
| 65 and Over | 932 | 5.3 | 1,925 | 8.1 |
| <i>Septicemia</i> | <i>32,890</i> | <i>25.1</i> | <i>54,525</i> | <i>27.6</i> |
| Males | 15,669 | 26.6 | 24,924 | 29.7 |
| Females | 17,221 | 24.3 | 29,601 | 26.3 |
| Under 15 | 453 | 2.1 | 570 | 1.5 |
| 15 to 24 | 568 | 3.7 | 1,071 | 4.0 |
| 25 to 44 | 2,557 | 9.7 | 4,855 | 9.7 |
| 45 to 64 | 8,989 | 30.1 | 15,467 | 31.3 |
| 65 and Over | 20,323 | 115.9 | 32,562 | 137.1 |

Health in Rural Missouri

2012-2013



For an electronic copy of the report, visit:
<http://health.mo.gov/living/families/ruralhealth/publications.php>

For additional information on this document, please contact:

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